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January 2006

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rob_jones@vnu.co.uk

Editorial

Dim the lights, open the popcorn, watch your PC

It's easier than ever to turn a PC into a PVR and get maps on a mobile, says Rob Jones

The ability to watch TV on your PC has been around for years and, depending on your needs, it has never been easier than now. You could choose to buy a PC running Microsoft's Windows Media Center Edition (MCE) operating system, or you could plump for one of the alternatives that come with your TV tuner card. A third route is to buy one of the software-only packages, which are particularly good for anyone with an existing tuner card who wants better software than what they already run.

In this issue we have looked at eight software packages that will let you watch TV and, in most cases, turn your computer into a complete personal video recorder, with the ability to pause and rewind live TV, record your favourite programmes and burn them to DVD should you want a permanent record.

The group test would not have been complete without a review of the previously mentioned Windows MCE, and we have the very latest version on test. Although we haven't listed a price for Windows MCE, because generally it comes pre-installed on a PC, it is possible to buy it if you are prepared to put in the work. Installing Windows MCE yourself is not for the fainthearted, and Microsoft ensures most people don't attempt it by selling it only to systems integrators. There is a fairly simple way around this, however, and that is to buy it along with another product, such as a TV tuner card. With a quick search online you should be able to buy it for around £78 plus the cost of the additional item. Gordon Laing explained the installation process in in his Hands on Hardware column in the March and April 2005 issues of *PCW*.

'If you're stuck for present ideas, take a look at our favourite 30 products of the year'

If getting decent TV reception can sometimes be something of a black art in the electronics world, so can map reading in the paper world. But with satellite navigation burgeoning, prices are rapidly dropping for GPS software. If you already have a PDA or smartphone, dedicated software is an attractive option, and we've looked at eight packages. I was a novice sat nav user, having stuck to the trusty paper map in the past. But, prior to Nigel Whitfield testing these systems, I took one for myself and embarked on a few journeys. I never got lost, but did find the package would occasionally insist on lengthy detours. The software was a touch fiddly to use initially, but spoken instructions were clear, if a little tinny, and it successfully guided me to places I hadn't previously visited.

A sat nav system could make a decent Christmas present, and if you're stuck for other ideas (or want to drop a heavy hint), take a look at our favourite 30 products of the year, some of which will make great presents. It was a fun piece to write, as the team looked back over the past 12 months and whittled down the 1,000 or so products we've seen to our favourites. They're not all award winners, but they are all good products. And if your name is Scrooge, we've even included freeware!

I must say, finally, that I was disappointed with HP's attitude towards our PC group test. Having sent manufacturers a brief that the complete bundle they submitted should cost a maximum of £1,200 including VAT and delivery, for HP to contact us as we were going to press to admit it had got it wrong, and that the price was £1,264, was very poor. Negotiation reduced the price to £1,243, but HP refused to drop this to £1,200 despite its huge mistake. **PCW**

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Microsoft faces new EC clash

Europe is heading for a showdown with Microsoft over new file formats to be introduced with Office 12, the next version of the company's office suite which is due to be launched late next year at the same time as Windows Vista.

The change promises to be something of a watershed, and not just because it affects applications used on nine in 10 of the world's computers. It bases the default file formats for the first time on Extensible Markup Language (XML), making them more versatile and far more open to users and rivals alike (see *PCW* news, November and December).

The issue exercising EC officials, and likely to be examined closely by other organisations across the world, is just how open they will be. Europe is committed to using standard open formats for documents exchanged between member states under a programme called Interoperable Delivery of pan-European E-government Services for Adminstrations, Businesses, and Citizens (IDABC).

XML itself is an open standard but the Microsoft formats using it are not, as defined by IDABC, because they are not agreed by an open process, nor by an independent non-profit organisation. Barbara Held, described as a 'detached national expert' working with IDABC, said: 'Microsoft could change them at any time.'

IDABC is 'promoting' the rival XML-based Open Document (Opendoc) format from the Oasis organisation. But it cannot yet adopt the standard because Oasis, like many standard-setting bodies, is a conglomeration of interested parties and therefore also not strictly independent. Sun, a leading light of Oasis and long-time foe of Microsoft, certainly has an agenda of its own.

But Oasis has submitted Opendoc to the International Standards Organisation (ISO) for approval, which could lead to its formal acceptance by IDABC.

The issues are far from straightforward. Held admits that Microsoft's existing formats are already a de facto standard in the EC by virtue of the fact that just about everyone uses them, but she says IDABC is not concerned with what formats organisations used internally – only with how they talk across borders.

She said the EC might set aside the issue of open independent process and accept the Microsoft formats if the company supplied modules to convert them, so far as is possible, into Opendoc. But she added that there was one fact she could not stress enough: 'The politicians in Europe are absolutely committed to open standards.'

Microsoft was fined about £350m by European competition commissioners in 2004 for alleged unfair use of its near monopoly.
● Office formats open to question – see page 22.

O₂ trials 3.6Mbit mobile access

Mobile operator O₂ has launched what it claims is Europe's first commercial High Speed Downlink Packet Access (HSDPA) network offering speeds of up to 3.6Mbits/sec. But the service will be available initially only in the Isle of Man, where the company trades under the name Manx Telecom.

The HSDPA network will offer mobile data services such as DVD-quality streaming video, music downloads and virtual-private network access as well as standard voice services.

Shortly before the launch, O₂ was bought by Spanish telecoms giant Telefonica for £17.7bn, creating the world's second biggest mobile operator after Vodafone. O₂ is the UK's most popular mobile operator with 24.1 per cent of the market.

O₂ has been working on the deployment of the HSPDA network since December, using Lucent kit including UMTS and HSDPA infrastructure as well as IP Multimedia Subsystem.

Telefonica is noted for innovative services such as what it claims is the world's first mobile interactive video series (pictured).

Interactive video comes to mobiles

Oracle offers free database

Oracle is launching a free version of its enterprise database system to head off competition from Microsoft's just-launched SQL Server 2005 and the open-source MySQL.

Beta versions of the Oracle Database 10g Express Edition (XE) for Linux and Windows are available for download and full versions will be released within weeks.

Storage capacity is limited to 4GB and XE won't use more than 1GB of memory. Support will be limited to online forums monitored by Oracle staff.

Marketing director Mark Townsend said that potential customers who might have rejected Oracle as too high end could 'now take advantage of the best database out there and just get started.'   *Tom Sanders*

BSkyB joins online gold rush

Satellite operator BSkyB's £210m purchase of UK broadband provider Easynet has signalled a gold rush reminiscent of the early dot-com bubble. It stems from the introduction of ADSL2+, a DSL upgrade that gives Britain's antique phone lines bandwidth enough to realise some of the dreams that inflated the bubble.

Now everyone in the business is chasing 'triple play' revenues by offering video on demand, telephony and broadband access.

BSkyB chose Easynet because it has equipment in more than 230 BT exchanges, offering 8Mbit links and trialling 24Mbit, and owns a national fibre backbone. BT, which had a cross-marketing deal with BSkyB, was openly peeved at the deal, which transformed a collaborator into a competitor.

BT reacted by bringing forward the announcement of new TV services it will offer in 2006. These include the delivery of 30 TV channels, the ability to watch any programme broadcast in the past week, a set-top box with a personal video recorder, interactive services, and video on demand.

BSkyB is likely to offer a similar package. Wanadoo and Tiscali have triple-play services in the pipeline. Bulldog, which is in more exchanges than Easynet, has just opened an entertainment portal.

Cable operator NTL, which is in the process of merging with Telewest, says it has ordered new set-top boxes with a PVR, and already offers catch-up TV in some areas. In theory, at least, cable has more headroom on bandwidth because DSL services are bolted onto old technology designed for another purpose.

But Bulldog's Gladys Elia claimed DSL could get faster still. 'Our technologists tell us we haven't reached the limit.'

Questions remain about the new services, however. Not everyone in the country will be able to get ADSL2+ , and even those who do will not all be able to get it at full speed because bandwidth drops off with distance from the exchange.

New technology is producing a cultural shift in which people view films and TV more like they read a book, in chunks at times of their own choosing. This will take time to evolve and online services will be just part of the story. You do not, for instance, need to go online for popular features such as timeshifting, and broadcasting will remain the most efficient way to deliver new content.

This is not to say there will be a second bubble. BT has the most to fear: it has a growing number of powerful competitors who can cherry-pick rich areas without sharing its obligation to offer services even where they are uneconomic.

Nano shows cracks in Apple success

Apple's reputation for reliability has taken a beating with complaints that screens on its Ipod Nano player scratched and cracked too easily. A class-action lawsuit against the company contends that it launched the device knowing the design was defective. Apple acknowledged the problem but claimed it affected only one-tenth of one per cent of those sold.

There was some good news, with the company announcing it had sold a million videos online within 20 days of the launch of a

new Ipod capable of showing them on a 2.5in colour screen.

Most of the downloads were of short music videos at $1.99 (£1.13), and analysts warned sales might stem from people trying out a new fad. But the figures will encourage content providers who see the emergence of a new platform, although Apple is far from the first to market such a device.

The Archos AV500, for instance, is the third model of a range that can double as a personal video recorder with timeshift and scheduled recording features; and it is not locked into content from Apple's Itunes store. It comes in 30GB, 60GB and 100GB versions for £350, £400 and £550 respectively.

Apple's 60GB version of the new Ipod costs £299 and holds up to 15,000 songs, 25,000 photos or over 150 hours of video. A 30GB version is £219 (prices include VAT).

The Archos AV500 (left) shares the capabilities of the new Ipod (above) but is not restricted to content from the Itunes store

£120m wastage

People who needlessly leave their computers on are wasting £120m a year, according to research by the Energy Saving Trust. Some 75 per cent of office works claim to be environmentally aware, but more than one in three do not turn off their machines overnight.

The Trust said this results in a million tons of carbon dioxide in the atmosphere every year. It also estimates home computer users waste £41m a year and pump out an extra 220,000 tons of carbon dioxide as a result.

Friends of the Earth has called for regulations ensuring products gave standby options that use far less energy.

UK search

A new search engine called Seekport is the latest to offer country-specific results, and includes a reference section that consults online encyclopaedias such as Wikipedia. Other features include searches of UK blogs, pictures and products, and up-to-the-minute news. The same company also indexes local content for Germany, France, Spain and Italy.

In addition, Seekport is seeking partnership deals to provide search facilities on third-party sites.

→ **www.seekport.co.uk**

2ms monitor

Viewsonic has launched a 19in LCD panel, the VX922, with a response time of 2milliseconds, and the 20in VX2022 with a 3ms response.

Hot product

Zyxel's AG-225H USB Wifi adapter has a built-in hotspot detector and drivers for the Mac OSX, Windows 2000 and XP operating systems.

Photo art

Corel has launched Painter Essentials 3, a home version of its Painter IX art software. The £69 package includes palettes that automatically render digital photos into 'paintings'.

ARM hits desktop speeds

UK chip designer ARM has launched its fastest processor yet, with claims that it will give handheld devices the processing power of a desktop computer while drawing a fraction of the electrical power.

The Cortex A8 chip is the first ARM chip to use a superscalar pipeline that can process two instructions at once, and has hardwired multimedia and Java acceleration.

It can clock up to 1GHz when made on a 65nanometre process and draws just 300mw in 'typical' use, clocking 600MHz. Direct comparisons with other processors are difficult, but the A8 is roughly equivalent to a Pentium ll, according to ARM marketing director John Cornish.

Multi-core versions delivering still more processing power are in the pipeline, although the A8 is designed for single-core applications in devices such as set-top boxes, games machines and portable multimedia players.

Several companies have already licensed a multi-core version of an earlier ARM11MP chip, but products using new designs can take up to a couple of years to appear. Cornish said ARM had a four-core ARM11MP running Linux in the lab.

'Multiprocessing is very important to us. It means we can deliver higher total performance and good power management capability. You turn off cores when you don't need them. So if you were using your PDA to look up a phone number, say, you would just have a single core running.'

Multiprocessor ARM systems have tended to assign different tasks to different cores, as if they were separate computers. To take full advantage of the architecture, software has to be multithreaded so that sub-tasks can be assigned efficiently round the cores.

Cornish admitted that much legacy ARM code, which is arguably in use in more machines than classic x86 PC, is not multithreaded, but said that is likely to change over the next couple of years.

ARM does not make processors itself, but licenses its cores to other vendors for use in systems-on-a-chip. The A8 design has been licensed by Freescale, Matsushita, Samsung and Texas Instruments.

Intel, which itself uses ARM cores, says it aims to reduce the power consumption of its x86 chips by a factor of 10, which means it would be competing with ARM in the mobile market. Cornish said they would still be drawing in the region of a watt, much more than ARM designs.

GDDR4 chip heralds fastest ever bandwidth

Samsung (www.samsung.com) is sampling GDDR4 graphics memory with a bandwidth of 2.5Gbits/sec per pin, or 56 per cent faster than the 1.6Gbits/sec of 800MHz DDR3. On a 32pin chip, that translates to 10Gbytes/sec, or the equivalent of two or three DVD-quality movies. Samsung said chips passing 2.8Gbits per pin per second will be out soon, and that this is the fastest in the industry. But both Samsung and Toshiba are reported to have sample chips using Rambus' extreme data rate (XDR) technology rated at least 3.2Gbits/sec.

GDDR4 differs little from GDDR3, making it far easier to implement in existing products or those under development.

2.8Gbits/sec chips are on the cards

Soft speed-up for disks

Disk performance can be boosted by 10 to 80 per cent with the aid of software developed by Sussex-based Diskeeper, the company claims.

It exploits the fact that different parts of a disk, or array of disks, have different performance.

Older products typically place files on the outside of platters where data is more densely packed. Diskeeper says their effectiveness is limited by the fact that their work is done by the disk controller, not the PC's file-management system; logical partitions and arrays also complicate the issue of what 'outside' means.

The Diskeeper code maps the performance of the storage system, then monitors disk accesses to see which files are requested most often, and places those in optimal areas.

Known as 'intelligent file access acceleration sequencing technology' (I-Faast), it is based on the logical and physical characteristics of disks and is adjusted if access patterns change, Diskeeper said. It is not yet available as a product.

'Safe' fuel-cell

A Japanese company has developed a 'safe' form of methanol, which it says is a breakthrough in enabling the use of fuel cells for mobile computers. Companies such as Toshiba, IBM and Sanyo are already experimenting with methanol cells, which could extend notebook life to days. But methanol is highly toxic, flammable and can cause explosions.

Kurita Water Industries has combined it with a compound that allows it to be stored as powder. To get the methanol out you add water.

Intel drops front-side bus

Intel is to ditch the front-side bus (FSB) in a new version of its Xeon processor in a change which is expected to spread to other processors, according to US reports. It is also delaying the new Montecino version of its Itanium processor until the middle of 2006 and reduced its top speed from 2GHz to 1.6GHz.

Both moves are something of a climbdown for Intel. The FSB is the aorta of Intel architecture, the data artery connecting the processor to the memory controller on the northbridge chip and indirectly to the Ram. It is seen as the main reason rival AMD has

been able gain the edge with its processors which have an onboard memory controller and talk directly to Ram.

So by scrapping the FSB, Intel is ignominiously following AMD's lead – something it has already had to do with the transition to 64bit. The company still massively outsells AMD, but the latter has been eating into its market share.

The high-end Itanium, cruelly nicknamed Itanic, has never had the market success Intel hoped for though the company repeatedly points out it is not addressing a high-volume market.

It does not use the classic x86 PC instruction set and faces competition in many of its markets from AMD's Opteron and, ironically, Intel's own Xeons.

Technology news website *Information Week* reports that the Montecino flavour is being delayed from early to mid-2006 to 'ensure that it hits quality expectations', and will not include Foxton technology to minimise power consumption and heat by controlling clock speed. It will also come with a 400MHz or 533MHz FSB rather than a predicted 667MHz and will clock a maximum 1.6GHz rather than 2GHz.

£130 Linux PC arrives in India

AMD and the Indian company HCL Infosystems have launched a 1.6GHz PC costing just £130 into the Indian market. It includes 128MB of Ram, a 40GB hard disk, and a 15in CRT monitor. Costs have been kept low by using obsolescent parts and Linux rather than Windows.

And multimedia guru Nicholas Negroponte has demonstrated a machine he says could be made for less than $100; his 'One Laptop Per Child' group plans to have up to 15 million in production within a year for use in economies where cost is a barrier to web access.

Laptops recall

HP recalled 135,000 batteries from some Presario, Pavilion, HP Compaq and Compaq Evo notebooks made between March and September 2004. The company has received 16 reports of overheating, in four cases there was minor damage when the units started to melt. Barcodes on the affected units start with GC, IA, L0 or L1.

In the Works

Microsoft's new £109 Works 8 suite bundles Word 2002 and 2006 versions of Encarta Encyclopedia Standard, Digital Image Standard, Money Standard and Autoroute Essentials.

Low-drain PowerPC too late for Macs

A Silicon Valley start-up has launched a power-efficient version of the PowerPC chip just months after Apple announced it was dropping the architecture. PA Semi, headed by Dan Dobberpuhl, lead designer of Digital's legendary Alpha chip, says the PWRficient processor draws 10 times less power than comparable chips.

The company has been working on the project in secret for two years from an office down the road from Intel. This is reminiscent of another firm Transmeta, which also produced groundbreaking low-drain chips. The parallel is not a happy one, because Transmeta did

Dobberpuhl: working in secret

not manage to break the hold of the big players of the chip market, even though it forced the industry to address the issue of power consumption. Intel and AMD (see below) have both announced drives to increase chip efficiency.

Apple decided to switch to Intel because PowerPC vendors IBM and Freescale could not match the power efficiency of its x86 designs.

The PowerPC architecture is used in machines at all scales. Dobberpuhl said: 'We chose to develop our PWRficient processor on the Power architecture because of its scalability, high performance and robust community of developers.'

The first dual-core PWRficient processor, running at 2GHz and drawing between 5w and 13w, will launch late 2006, followed by single- and four-core versions in 2007 and eight-core in 2008 according to the company's roadmap.

Dual-core Turion 64 processor expected from AMD

AMD plans to increase the number of cores on its processors and boost their power efficiency while reducing consumption, the company said at a briefing at the opening of its new Fab 36 plant in Dresden, Germany.

A dual-core Turion 64 mobile chip will be launched by the end of 2005, which should enable some very interesting laptops. A 940-pin desktop processor socket, codenamed M2, will also be introduced in 2006 for processors with DDR2 memory support.

A partitioned version of AMD's Powernow dynamic power management technology will allow individual cores or even parts of the core to be shut down when they're not needed.

Also on the roadmap is an architecture called Pacifica that will allow virtual PCs – logically separate computers within the same physical PC – to be run with much less software overhead.

The Opteron range will be the first to move from dual- to multi-core (up to eight were mentioned)

Getting down to work in the clean room at Fab 36 in Dresden

but the change will spread to all products eventually. Server architectures will gradually move

towards mainframe-like hardware partitioning of applications, preventing a crash of one application from affecting other mission-critical programs.

The state-of-the-art 300mm Dresden fab will start shipping 90nm processors in early 2006, migrating to 65nm before 2007.

AMD's aim over the coming years, chief executive Hector Ruiz said, was to grow its share of the CPU market from its current 20 per cent to 30 per cent or more. *Kelvyn Taylor*

4GB SD card

Transcend has launched a 4GB SD card, allowing you to store a movie on something not much larger than a postage stamp. It costs €399 (£274) and, with a 22.5Mbytes/sec transfer rate, you could fill it up in about three minutes. It must be used in devices that support Fat32 SD cards.

Vertical market

Seagate has launched what it says is the first notebook drive to use perpendicular recording, in which magnetic bits are aligned vertically to increase data density. The Momentus 5400.3 squeezes 160GB on two 80GB platters with an areal density of 130Gbits/in^2 and will feature Seagate's Full Disc Encryption technology.

PDA phone

Smart Devices is selling the £445 Qtek-9100 Windows Mobile 5 PDA with quad-band telephony, 802.11b Wifi and Bluetooth support, slide-out keyboard and 1.3megapixel camera.
→ **www.smartdevicesdirect.com**

Corel offer

Corel is bundling a Creative Muvo mp3 player, worth £79.99, with copies of its £359 Coreldraw Graphics Suite 12 purchased before the end of 2005 from any leading reseller or www.corel.co.uk/mp3offer.

Indian browser

Hindi and Punjabi versions of the Opera browser for Linux and Windows are now available at www.opera.com/download.

Homes may sell Wimax access

BT is considering offering Wimax wireless access as a competitor to 3G mobile links – perhaps by getting home access boxes to double as public base stations. The idea, first mooted for Wifi, is that homes could subsidise their own broadband use by selling bandwidth to passers-by.

It could be more viable with the longer reach of Wimax, which also offers security and multimedia-class quality-of-service features that have only recently been added to Wifi (see story below).

'Wimax is everything Wifi should have been but wasn't… it is a much better competitor for 3G,' said Keith Dickerson, head of standards at BT Group's chief technology office.

BT originally saw Wimax as a way of taking broadband to places DSL could not reach. But Dickerson said it could now be installed just about everywhere. 'We may use Wimax as a temporary measure to plug the gaps, but we see a far wider use for it.'

Intel has said it will put Wimax into notebooks as standard, as Wifi is on Centrino laptops today. Dickerson said BT assumed that this would happen within three years.

He implied that just 'a few people' within BT are interested in using home boxes for public access but it would certainly get round the problem of where to site base stations.

Users in a Wimax cell have to share 70Mbits/sec of bandwidth, which means cities will need a lot of access points. This entails small cells, which have the added advantage of needing less transmit power, saving batteries on client devices and answering fears (ill founded or not) about risks to health.

Much will depend on the allocation and auction of spectrum over the coming years, particularly of frequencies freed by the digital switchover of broadcast services.

There will be competition, including from proposed DVB-H and DAB mobile data services, particularly for lower frequencies that penetrate buildings.

If BT does start Wimax access services it will be competing with its own spin-off O$_2$; but this has just been bought by Spanish Telecoms giant Telefonica for £17.01b.

Gateway to safety and efficiency

D-Link's DFL-M510 Information Security Gateway controls internal use of a network as well as protecting against malicious traffic including Trojans, spyware, adware and worms.

It improves flow by restricting use of unauthorised applications and traffic on networks of up to 150 people, and isolates computers or groups infected with viruses. It is available now for £1,109.

Intel-backed group pushes faster Wifi

A consortium of 27 Wifi vendors has formed to accelerate the specification and adoption of the next-generation 802.11n standard for a 'real throughput' of 100Mbits/sec.

The Enhanced Wireless Consortium (EWC) has drawn up a specification to support speeds of up to 600Mbits/sec – six times faster than most wired local networks.

The real throughput would be much less because of networking overheads, but EWC says these should be reduced by more efficient protocols and that at least 100Mbits/sec will be guaranteed.

The proposed new technology will use the same 2.4GHz and 5GHz bands as today's 11x devices and will interoperate with them.

The consortium includes many important vendors, but Intel is seen as very much the prime mover. The speed of adoption of Wifi standards by the IEEE organisation is glacial at the best of times, usually because of competing vendor interests rather than any technology problems.

It has only just agreed the 11e standard for quality of service, which ensures the timely delivery of multimedia, though the need for it has been seen for half a decade. Negotiations over an Ultra Wideband (UWB) standard have stalled. The protracted negotiations over 11n have led to a plethora of non-standard 'pre-n' products offering double the speed of 11a or 11g devices.

An EWC statement said the idea was to present the IEEE with a specification on which there is already broad agreement in the industry. But there were immediate accusations that Intel was hijacking the standards process and bullying most of the key players into its camp. Airgo, one of the companies that pioneered the Multiple In Multiple Out (Mimo) technology on which 11n will depend, is seen as having been squeezed out.

'Near photo-quality' on paper

Epson has been showing off its new Durabrite Ultra ink, which it says prints photos on ordinary paper better than any other current product.

The secret lies in two resins in the ink. One has an affinity with a substance known as 'size', which is used to fill tiny gaps in paper to create a smooth surface. Epson says it binds with the size to produce a surface something like that of glossy photo paper.

The other resin solidifies into a protective film above the pigment. The combined effect gives the print an appearance close to that of a glossy print, according to Epson.

The inks are also resistant to water and smudging, aided by the fact that they use insoluble pigments rather than water-based

Epson cartridge line in Telford

dyes. To prove the point the company immersed prints in water during demonstrations at its UK cartridge factory in Telford (pictured left).

The print quality on plain paper does look good but you still need glossy paper for full photo quality. Epson says its colours can last up to 120 years in an album, where they are protected from the light.

Durabright Ultra cartridges are used in Epson's latest range of printers, which include three neat little all-in-ones, the DX4200, the DX3800, and the DX4800, ranging in price from £61 to £102. Cartridges are sold in individual colours at £6.80 each.

These inks are different from those sold with dedicated photo printers because they are optimised for a wider spread of tasks.

Photo printers cut off from PC

We're got used to devices like PVRs pretending they are not computers for fear of scaring off technophobes. Now it's happening with photo printers as vendors try to attract PC-phobic digicam users.

The Lexmark P450, odd-one-out of this month's group test on page 108, can print directly from just about any card or USB stick and burns pictures to a CD. It even lets you view them on a TV, but it can't connect to a PC.

Seems a bit like locking out the top gear of a car so as not to scare off slow drivers.   *CA*

Office formats open to question

Microsoft insists that its new document formats are completely open, yet it failed to reconcile them with the Opendoc industry standard. Is it a plot to retain world domination? Clive Akass reports

I t is hard at first sight to see what the fuss is all about over the rival next-generation office formats (see page 14). The Office 12 and Open Document formats are both based on XML, which uses a simple (in principle) tagging system to describe the layout and content of office documents.

You can create your own set of tags and any XML-savvy application should be able to use a document based on them so long as the file includes a description of your tags or a pointer to one.

This seems so flawlessly open a framework that you may wonder why Microsoft, notoriously more interested in locking in users, is adopting it. The company says that XML is too useful to ignore; rivals say Microsoft did not have any option – if it did not make the move, the rest of the world would.

But if XML files are self-described, does it matter that Microsoft has created its own tag-set rather than agreeing a standard with the rest of the industry?

The problem is that self-description is not mandatory, according to an Oasis representative who did not wish to be named (showing the complexity of the industry politics involved).

He said Microsoft could 'slip a little undocumented tag in here

Bill Gates unveils Office 12, due to launch in late 2006, at a recent conference

and there' so a file would work properly only with Windows software – the XML equivalent of an undocumented programming interface. Or Microsoft could introduce a changed or new XML schema for which it had pre-prepared its own environment, forcing others into major re-engineering – entire business processes can hinge on the meaning of tags.

Microsoft insists that its XML schemas will be open; but as a convicted monopoly abuser whose programming interfaces were opened fully only after lengthy court actions, it can hardly blame people for doubting its word.

Curiously, it is a member of Oasis, the organisation that created Opendoc. It even had a representative at an Oasis adoption forum in London last month, who said Microsoft was contributing to the organisation's web-services standards – and that it had gone its own way on Office 12 formats because they require functionality that is not supported by Opendoc.

Other Oasis members say the functionality is not supported because Microsoft did not take part in the committees drawing up the standard – and that it could still be included if the company co-operated.

The fact remains that Office 12 formats are far more accessible than the old ones and promise many benefits to businesses and organisations – not to mention a lot of upgrade revenues for Microsoft.

But they also carry a risk to Microsoft. Businesses, realising that Office 12 will bring major changes to their way of operating, could take the opportunity to look at software from Microsoft rivals – who will find the new formats easier to reverse-engineer than the old.

Moreover, European officials are surely right in insisting on truly open standards for fundamental business applications. Microsoft has for years been able to say that its Office formats are a standard by virtue of the fact that at least nine in 10 desktops use them; but this will not be the case with the Office 12 formats. In fact there could be considerable resistance among those business and private users, probably a majority, who need only basic office functionality and find themselves suddenly having to cope with two formats.

The world has become wary of becoming hooked on Microsoft and you can bet that Europe and Massachusetts, which has also declared for open formats, will not be the only ones to hold the company to account.

Standards will loosen Microsoft's hold on desktop

Several key government officials, including at least one representative of the Cabinet Office, attended last month's Oasis adoption forum in London. But there is no chance of a major flight from Microsoft in government departments.

IT strategist John Borras, head of the Local e-Government Standards Body and former Oasis board member, points out that there are more than 100,000 desktops in the Revenue and Customs department alone. 'The

cost of replacing that [software] and retraining all those people would be huge.'

He said open source had its place in some back-end systems. 'But at the desktop level people are reluctant to rely on it because you cannot guarantee its robustness and that if something goes wrong there will be someone there to fix it.' But neither is the Government flirting with Oasis and open source in order to gain leverage on Microsoft over maintenance fees. Borras pointed

out that Britain negotiated a deal on those two years ago.

The use of XML, particularly in a standard form, will in itself open up the software market because it gives complex files the universality of an Ascii text document, which can be created or read by just about any word processor. Borras said: 'It is a very good way to get interoperability for everyone at very little cost.'

Which is another way of saying that it will no longer be necessary for everyone to use the same

application software. No wonder Microsoft is loath to go too far down the open road.
● Avanquest is to sell Sun's Staroffice 8, the first commercial suite to support Opendoc, thoughout Europe. Based on open-source code, it runs on the Windows, Linux or Solaris operating systems. It costs £69.99 from www.shop.avanquest.com/uk or retailers and comes with word processor, spreadsheet, presentation, drawing and database modules.

Global messaging moves a bit closer

Yahoo and Microsoft are to allow users of their instant-messaging (IM) services to communicate with each other, in a first step towards resolving one of the great absurdities of electronic communication.

IM clients, which now encompass video and audio as well as simple text links, have the potential to evolve into the standard communications interface of the 21st century.

In Britain, Yahoo's Messenger is already incorporated into BT Communicator, the official BT platform for Voice-over-IP.

But IM's scope has been hampered by the reluctance of operators to open a captive customer base to rivals.

Google, which recently launched a beta IM service called Google Talk, has criticised AOL, MSN and Yahoo for locking out other networks. Similarly Microsoft, when it launched its MSN Messenger service, tried in vain to force AOL to open its IM.

The result is that none of the leading IM platforms talk to each other, giving rise to so-called unified messengers such as Trillian for the PC and Fire for the Mac. These manage multiple user accounts, so users do not need to run a separate application for each messaging network.

Yahoo and Microsoft claim their link-up, which will be completed early in 2006, will create the largest IM community of 275 million accounts. However, analysts The Radicati Group reckon AOL has 56 per cent of the global IM market, while Microsoft and Yahoo combined have around 40 per cent.

MSN will soon be linked with Yahoo

Xbox streams video to TV

Owners of Microsoft's Xbox 360 will be able to stream standard and high-definition TV from their PC to a TV with the aid of an upgrade to Windows XP Media Center Edition.

Also included in the update, which will be available with new Media Center PCs, is support for DVD jukeboxes. Users will be able to manage up to 200 DVDs in an external changer and view any one of them. An Away mode allows a PC to record a show or stream media to another box while the machine is in a low-power state.

Update Rollup 2 for Windows XP Media Center Edition 2005 is available from www.windows update.com. It will also be installed on new Media Center PCs.

Excite IT takes a Dab at etailing

Excite IT has launched against online retailers such as Dabs and Ebuyer, claiming to have found a gap in the market. It focuses on high-quality customer service, which it believes is missing in the etail sector. It's a laudable aim, but with seven staff currently fulfilling about 30 orders a day, it's not too difficult to meet. The real test of its plans will be if it becomes popular and has to fulfil thousands of orders every day. www.exciteit.co.uk   *Rob Jones*

Never waste time searching for a disc or file again!

Disc Stakka CD & DVD Manager –
with OpdiTracker disc and content management software

The Imation **Disc Stakka** is a powerful hardware and software solution that provides all the tools required to protect optical discs and manage the files they contain. The **OpdiTracker software** creates a database of your CDs and DVDs and provides "virtually online" access, enabling you to *locate and access any disc or file in the database within seconds.*

before
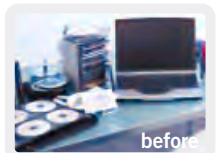
You can browse the database or search by typing in keywords to describe the file you want and the **Disc Stakka** automatically ejects the disc on which the file is stored.

after

- Holds up to 100 discs, including data CDs, DVDs, music, games and software discs
- Connects to PC or Mac via USB for power and data connectivity.
- Can be stacked 5 high to create a tower of 500 discs with no extra cabling

For more information and a flash demonstration, log on to:

www.imation.co.uk/stakka

Available from www.amazon.uk, www.ebuyer.com and selected PC World stores.

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SED displays enter the ring

C anon is to launch a 55in high-definition TV in 2006 using a surface-conduction electron-emitter display (SED), claimed to combine the best of LCD and plasma technologies with none of the downsides.

An SED screen is similar to a cathode-ray tube in that it works by firing electrons at phosphors at the back of a glass screen. But whereas a CRT uses three electron beams to trace out the red, green and blue elements of an image, an SED has an electron emitter for each pixel. This allows an SED screen to be much slimmer because its electrons are firing dead ahead (see diagram) – standard CRT guns have to sit well back from the phosphor in order to be able to 'see' the whole screen.

Canon began SED research and development back in 1986, and in 1999 teamed up with Toshiba to develop commercial products. Canon and Toshiba claim SED delivers a sharp picture with pure blacks, vibrant colour, fast response times, wide viewing angle and relatively low power consumption.

At the Paris Expo, Canon put a 36in SED panel side-by-side with a 37in plasma and an LCD TV, showing the same material in a darkened room. The competing products were not named and their configurations were not described, but we were assured they were using default settings. The SED image was considerably brighter and more colourful than both the plasma and LCD, with very wide

Flatscreen SED display
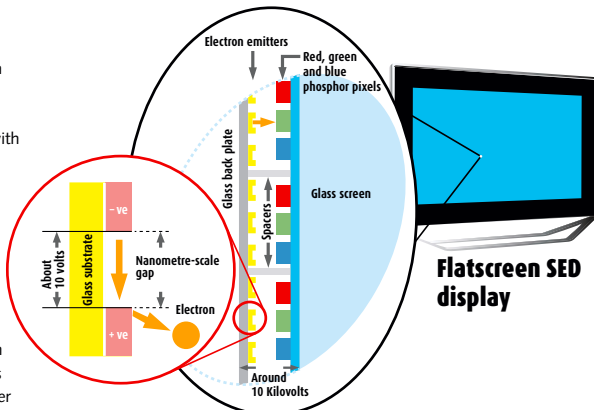
How pixel guns let the CRT fall flat

The pixel-sized emitters on an SED screen fire dead ahead, allowing a format similar to that of an LCD panel (left). Each SED emitter (right in this much-simplified diagram) consists of two conductors just a few nanometres apart – one nanometre is a millionth of a millimetre. Around 10v applied across this tiny gap creates an enormous electric field, causing electrons to flow between the conductors. Some of the electrons gain so much energy that they 'bounce' outwards. The front of the device is held at around 10,000v with respect to the emitter, accelerating these electrons towards the phosphor.

viewing angles and black levels as deep as plasma. No mention was made of screen-burn.

Power meters were connected to the three displays while showing the same video. The SED consumed between 92w and 138w, the plasma 95w to 202w, and the LCD with its constant backlight burned a steady 135w. During normal viewing the SED certainly appeared to be consuming less power than its rivals.

The SED TV will be launched in Japan in 2006, with a version likely to appear in Europe in 2007.

● SED is not the only technology to use pixel emitters. A Californian company, Telegen, showed a system at Comdex Fall in 2000 using rows of warm filaments that 'boiled off' free electrons – the same thermionic emission as the CRT's gun. When a voltage was applied, phosphor-coated anode strips attracted these electrons. The strips were at right-angles to the filaments, forming an address matrix at which the electron flow at each crossing point could be controlled to build an image (see *PCW,* February 2001, page 49).

Hydrogen cell powers digicam

Canon holds its Expo every five years, in Paris, New York or Tokyo, as a showcase for its future technologies. The major announcement by chief executive Fujio Mitarai (above) at 2005's three-day Paris event was Canon's involvement in displays using its SED flat-panel technology (see right).

There were also demonstrations of enhancements to familiar business and consumer products, along with details of the latest environmental technologies, with exhibits on green production and recycling.

Canon also showed a digital SLR camera powered by a hydrogen fuel cell, which does not emit a greenhouse gas such as carbon dioxide when producing electricity. But the cell would become viable for consumer devices only if hydrogen was being mass-produced cheaply for other applications, such as powering cars and homes.

The prototype micro fuel cell used hydrogen cartridges to deliver the same power as a lithium-ion pack with the same physical volume; in the future, the hydrogen cells could have much higher capacities.

Some of the most impressive demonstrations at the Canon Expo involved work in medical and visualisation tools. A prototype video X-ray machine allowed the body and internal organs to be studied in motion, while prototype visualisation goggles allowed you to pick up a virtual object on a real plate and study it at any angle, while your real surroundings remained visible.

Digital SLR camera has organic display

Canon showed a prototype digital single-lens-reflex (SLR) camera using an organic light-emitting diode (OLED) display that generates its own light, unlike traditional LCD screens that use coloured filters and a backlight.

This gives OLEDs a wide viewing angle and lower power consumption, both of which are very useful for digital cameras.

The Canon prototype had a 2.4in QVGA (320 x 240) screen

that delivered a bright and detailed image with 167pixels per inch (ppi). It's expected to be used on products within two years, and puts Canon in the unique position of being able to make virtually every component in a digital camera. It already produces optics, image processors and the Cmos sensors used in its digital SLRs.

Other imaging products on show included Canon's HDV high-definition camcorder and a

Wifi-equipped prototype still camera that could quickly transfer images and be remotely operated by computer with a live screen preview.

Nikon recently announced two cameras with Wifi, and Kodak demonstrated its Wifi Easyshare One at CES in January.

Drawing the largest crowds at the Expo was a prototype camera that tracked multiple faces and took a shot only when they smiled.

LETTERS

★ LETTER OF THE MONTH

Tech for tech's sake

Congratulations on the new look. PCW has always been my computer magazine of choice for well-written and informative articles. Now it's more readable than ever.

Like you, and no doubt most of your readers, I have a passion for technology. My first computer was a floppy disk-driven Amstrad PCW circa 1987. My latest is a Pentium 4 model with a 17in TFT screen. Using the excellent Serif Photo Plus 10, I have been able to colour some old black-and-white photos of my children taken 50 years ago.

Having updated my hifi, I've transferred all my old music to CDs. My trusty old Nikon SLR is gathering dust while I snap everything in sight with a digital camera. Microsoft Money manages my finances and I track my car's running costs with a homemade Delphi program.

But I sometimes wonder whether much technology is being used simply for the sake of it. Although I love my new PC, purchased to replace my four-year-old model, I often feel it is rather like buying a Ferrari and putting a roof rack on it for the weekly shopping trip.

Even so, in no way does this blunt my sense of excitement and wonder at the sheer inventiveness and breakneck speed at which technology is pushing back the boundaries. One day in the future, the quantum computer will be as common as today's PC – infinitely more powerful but probably much smaller and very much faster. I don't expect to be around to see it, but if I were, I know I'd still want to have one.
John Revell

WHO WILL PAY FOR VISTA DRM?

I read with alarm the efforts Microsoft is going to in Vista to provide DRM (*PCW* November).

As a programmer, I wonder who is going to pay for the extra effort I will have to put in to implement this security scheme.

As a home user, it sounds like I am going to have to buy a whole new set of hardware to play CDs, DVDs and games. As a network administrator, I will be holding off upgrading the company's network for as long as possible.
Eamon Kelly

I DON'T WANT TO BE PROTECTED!

I have just read your article on Windows Vista (*PCW* November). I started computing in the 1980s with a ZX81. I then learnt 6502 assembly on the BBC and Z80 assembly on the Amstrad 664. I have used CPM and Dos. I have gone through Windows 3.1, 95, 98 and now XP.

I have written programs using Visual Basic and Delphi. So along comes Vista and Microsoft believes it needs to protect me from breaking my operating system. Who do they think they are? I do not need to be a protected administrator. I want to be able to access and change any file on the system that belongs to me. I want to be able to delete any file and alter any Registry setting that suits me.

If I break the operating system all well and good; it's only a computer, it can be reloaded and you learn from your mistakes. It annoys me when Microsoft plays God and thinks we need protecting. An example of this on XP is cookies/index.dat. I can replace this file with the default on any of my family

users' settings but it will not let me replace my own version.

I have to restart in safe mode and delete the file from a command prompt. It's the same for other index files that grow and grow. Listen, Microsoft – I don't want protecting. Provide the facility by all means for those who do want it, but don't force it on those who don't. I won't even start commenting on DRM yet! Time to get the Amstrad back out of the cupboard.
Malc Parr
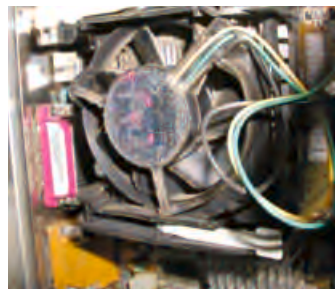
A build-up of dust can damage your PC

DUST IN COMPUTERS

I have just replaced my PC, as the power supply unit had failed. This was due to a large build-up of dust in and around the fan in a sealed unit that was not accessible to cleaning with either vacuum cleaner or compressed air jet.

The fan eventually became stuck and it had overheated. Mind you, the thing was pretty obsolete and needed replacing anyway, but why was the dust there at all? It had been cleaned at times according to your Spring clean your PC feature in the March 2004 edition, but obviously to no avail.

Dust is everywhere, so why can't computers have air inlet filters, easily accessible on the back of the case?

No great engineering would be required to fit an easily replaceable disposable paper device onto the fan air inlet. 'Oh, but people would forget to change them, and the fans would get overheated as before', was the reply when I mentioned this to a computer-maintenance man.

So, a small program could be inserted that displayed a message at start-up after so much running time such as 'Warning – it is 200 hours since your last air filter change. It may get clogged and if not changed soon will result in damage to your computer.'
Charles Moon

Kelvyn Taylor replies: There is a product available from the US called PuraPC (www.purapc.com) that consists of replaceable fan filters and a reminder utility. We haven't tried it, but it might be worth checking out. However, preventing dust ingress through case seams and drive bays is impossible unless the case is a sealed unit. A regular PC service is the best policy – see our original article online at www.pcw.co.uk/2045884. Some good cases do incorporate basic dust filters – the Antec Sonata I use is an example.

ISPS SHOULD BE LIABLE FOR VIRUSES

If computer viruses were to suddenly be eradicated overnight, much to the delight of users,

Does Windows Vista look familiar to you?

what would be the reaction of software producers?

After all, anti-virus protection is a multimillion pound business. I imagine their reaction would be dismay, disbelief and horror as software became obsolete and millions of pounds worth of business was wiped out overnight.

The majority of viruses come from the Internet and ISPs, I am sure, could prevent most getting to the end user. If the public can protect their systems with the available software, why can't the ISP do it for us?

While I am not going to suggest the likes of Norton clap with glee when another virus hits the Internet, let's be honest, it does bring in the millions. And the cost of anti-virus producers' advertising must run into millions per year, so by scaremongering they pressure people into believing they must have the latest anti-virus software.

It is time that ISPs were liable for the content of what is downloaded from the web and, should the content contain harmful viruses, they should be liable for repairing the damage.

I wonder how far away we are from the first test case.
J Shingler

Rob Jones replies: If it fell to ISPs to legally protect us, we would end up in an Internet nanny state, because ISPs would only allow us to view sites they had vetted and approved. I don't want this and I don't believe the majority of Internet users want this either. Also, they would pass on the cost of protecting us, so we would still end up shelling out money, only to a different organisation.

NEXT STEP FOR VISTA?

I've just been reading about the Vista version of Windows in the
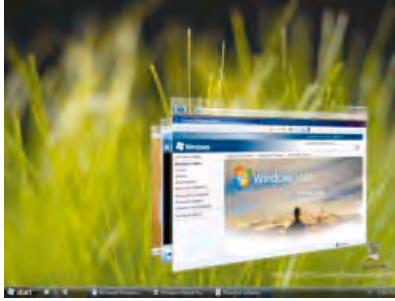
November edition of *PCW*. Is it just my imagination, or do the screenshots confirm the suspicion that each succeeding version of Windows begins to look ever more like the Steve Jobs' OS of 10 or 15 years ago, Nextstep (or whatever it was called)?

I guess that's progress for you.
Andrew Campbell

MORE ADS, PLEASE!

Congratulations on the new *PCW* format. Although a reader since the 1970s, this is the first time I have written in, so here goes with some feedback.

First, I want the adverts because I BUY THINGS! So plenty of adverts, large and small please. However, I am really irritated by advertisers that insert card stiffeners, fold-outs and so on which interfere with flicking through to find something. I rip these out of my subscription copy and never read them.

I particularly liked the SLR review in the December issue as I am currently looking for one of these. I am also looking for a new all-in-one printer/scanner/fax/copier to reduce desk clutter, but it's been a long time since your last review of these – how about a group test?

About the new format, I particularly like the Letters pages – I really must disagree with Kelvyn and support David Morgan on this (Letters, December 2005). I also carefully study the Hands on pages and keep these the longest – most of the rest I clear out after a couple of months.

One final point: please make the issue date clearly visible on

both the magazine and cover disc as this is a great help when searching for a particular item.
Eric Rogers

Kelvyn Taylor: Thanks for the 'to do' list – we'll do our best to oblige.

APPLE TO THE CORE

Good grief! I have just read in the December issue of *PCW* that I can now buy a new front end for Windows that will make it look and behave like an Apple running OSX. However, I doubt that Object Dock will do anything to improve Windows' reliability or any of its horrendous catalogue of flaws.

If people want OSX that badly, then I suggest they go out and buy a new Apple computer. After 25 years of Dos and Windows I did just that last May. What a revelation. It took me just a few hours to find out how the thing worked and since then I have been so much more productive – without a single problem. Everything just works. This is how computing should be.
Stephen Blake

THE ADVISER

PCW GIVES ADVICE ON YOUR RIGHTS

➔ **Send details of your dispute to theadviser@pcw.co.uk.** Please provide a daytime telephone number so we can contact you if necessary.

COVER YOURSELF

● **Keep good records; store all receipts in one safe place** as proof of purchase is vital.

● **Create a folder in your email client to store emailed receipts – and print a copy.** Print spec sheets from websites as proof of an order.

● **Get written quotes** specifying components used.

● **Use a credit card for purchases of £100 or more –** credit card companies are liable if the vendor goes out of business.

● **Do not try to repair faults –** this invalidates your rights in the majority of cases.

● **Think before buying expensive hardware outside the EU,** because if something goes wrong, enforcing your rights is difficult. Shipping faulty kit back will be costly.

● **Never cancel a direct debit or standing order as a means** to resolve a dispute over payments or service. You may get a poor credit rating and face court action.

HOW TO COMPLAIN

● **Keep records of who you speak to,** along with any paperwork and emails.

● **Stay calm – companies will respond defensively to abuse** and shouting, regardless of whether you are in the right.

● **If the dispute reaches an impasse, insist on escalating** the complaint. Get a director's name and send correspondence by recorded delivery.

A MISSED VISIT

Dell sent the £3,300 PC I ordered without the additional CD drive and Wifi card specified.

The speakers and wireless desktop set did not work but, most annoyingly, the engineer visit I paid for to set up my network never materialised.

I tried to call Dell many times but my enquiries were ignored and phone calls not returned. Eventually I contacted the service centre, which I then found out had been outsourced to a company called Netlogic.

The staff there were sympathetic and sent an engineer to confirm that the parts were faulty. Without Dell's authorisation, the engineer was unable to replace the parts or carry out the work.

Netlogic contacted Dell on my behalf but even then there was no satisfactory response.

I've now replaced the broken peripherals, paying for them out of my own pocket but I want Dell to honour the installation visit I paid for nine months ago.
John Matchett

Dell failed to send an engineer out even though a premium had been paid

Most reasonable people accept that supplied products will sometimes be faulty, and even that orders can be incorrectly dispatched with some parts of the order missing.

We even understand that miscommunication can occur and messages lost. What is not reasonable is when companies fail to deliver even the most rudimentary level of customer service.

Mr Matchett has been trying to resolve this situation with Dell for nine months. He spoke on the phone with one account manager 14 times and yet no action was taken to request the broken items be returned for repair or replacement.

Dell's failure to send an installation engineer when a premium was paid for the service is a clear breach of its contract of sale, and Mr Matchett would have had a very strong case to pursue a refund for the service.

It could also be argued that as the installation service was booked to set up the wireless capability and that no Wifi card was supplied, the PC itself was unfit

for the purpose for which it was bought. However, if he attempted to pursue a refund for the PC now, his patience with Dell's incompetence would count against him, as he has had some use from the PC and any refund agreed would be on a pro rata basis. After nine months, he would be likely to retrieve only a fraction of the purchase price.

All Mr Matchett wants is the PC he ordered in working order with an engineer visit to set up the network.

An email from The Adviser team spurred Dell into action and the engineer visit has been arranged. Mr Matchett will let us know if the company makes good on its word this time, and we will let you know if it doesn't.

CANCELLING CONTRACT CONCERN

I'm tired of waiting for NTL to provide a personal video recorder (PVR) facility in its service so I want to move to Sky.

However, my broadband connection comes in through the set-top box and not via a cable modem. I'm more than satisfied with NTL's broadband so I don't want to change the entire package but I wanted to check the position on contracts.

I've had a read through some forums about NTL and I'm concerned about how the company treats people who want to cancel a service and am unsure of how to cancel.
Chris Bold

Forums can be an interesting way to check up on a company, but it's important to keep things in perspective.

Bad treatment and poor service deserve to be commented upon and the web makes that simple, but people rarely feel compelled to set up forums when a service goes according to plan with no hitches.

There has been some confusion over the cancellation arrangements for NTL customers, however. *PCW* readers who tried to cancel by phone (as many of them subscribed this way in the first place) were told they had to cancel their service in writing. Various forums tell tales of cancellation letters mysteriously disappearing in the post, even when sent by recorded delivery. Confusion reigned over exactly when services had been cancelled, whether from the date of contact, receipt of letter or collection of equipment.

NTL has now changed this so customers can simply cancel by phone, with 30 days' notice applied, providing they do not try to cancel before the end of the initial 12-month contract.

If they do, NTL can charge for the total remaining value of the contract. If the two services were offered together with a discount rate, the rate for the broadband service alone may change. This does not apply if the service is not being provided properly, but never cancel a direct debit as a means of resolving a dispute.

Only a small percentage of NTL customers receive broadband via a set-top box and NTL assured us it would be possible for customers wishing to get integrated PVR features to retain the box for broadband and cancel the TV payments.

Return to sender

I bought a Panasonic digital camcorder from Purelygadgets.com but was unable to transfer footage to my PC. When I contacted the retailer, I was asked to return the item to them at my own expense so I called the Panasonic service centre number and arranged to have the item collected for repair. After two weeks I was told that a new main circuit board was needed but none were in stock. I asked Panasonic for a replacement but the company said it was not responsible. When the product was returned, it broke again within weeks. This time I sent it back to Purelygadgets who sent it straight to the service centre. There has been a further wait, but Purelygadgets won't replace the item or refund me as it claims I broke the warranty terms.
Theresa McHugh

Repairs must be managed by the company that accepts your money in the initial purchase – the party with whom the contract of sale is made. By sending the camcorder straight to the manufacturer without being asked to, Purelygadgets argues Mrs McHugh has attempted her own repair.

Retailers often ask consumers to send faulty items straight back to the manufacturer as it speeds up this process, so it seems petty that Purelygadgets has chosen to interpret this as attempting repair by a third party. If you need to send an item back for repair, contact the retailer first and if they ask you to deal direct with the manufacturer ask for email confirmation. As for the postage costs, unless you have a collect and return warranty the retailer can ask you to send items back, but it is possible to reclaim costs if the item is inherently faulty.

Consumer law sometimes seems of little help, as only judges can penalise retailers. Whether a judge would decide it was reasonable for Purelygadgets to sell an item that could not be used for four months is open to question but, as companies know all too well, few consumers can be bothered with the time and expense of taking small claims action.

Purelygadgets has now agreed to refund the delivery costs incurred for the second repair, and returned the camcorder in working order but maintains that it cannot be held accountable for a refund.

KNOW YOUR RIGHTS

● **In England and Wales, the retailer must prove that faults found within six months of purchase are not inherent.**

● **Consumers should not suffer financial loss in order to repair a faulty item, so postage and courier fees should be claimed back if the fault is inherent.**

● **Companies are not obliged to repair goods damaged by accident or misuse.**

● **The contract of sale is between the buyer and the company that accepted your money. It can be quicker to deal direct with manufacturers, but do not let resellers bully you into this.**

● **Goods ordered online, by post or phone can be returned within a reasonable time under the Distance Selling Regulations. This is widely accepted as being seven days.**

● **Companies cannot charge for services they fail to deliver, regardless of any contract you have signed – the contract goes both ways.**

● **Benefits provided under extended warranties are an addition to your statutory rights, so buying one does not invalidate your consumer rights under legislation.**

● **Online auction sellers are only obliged to ensure goods are described accurately. However, individuals selling more than one of an item, and those listed as power sellers, may be classed as businesses rather than individuals.**

● **For more detailed information on consumer law in England and Wales, visit www.oft.gov.uk/ consumer. In Scotland, visit www.scotscourt.gov.uk.**

CONTACT THE ADVISER

If you're involved in a serious dispute with a seller, send us a brief description of your complaint, name the company involved and provide an order number or other information that we can use to identify your order with the company. We cannot guarantee to resolve your dispute but we will try. We obviously cannot take on every case, but the answers we give should help readers to resolve their own disputes.

You can also get advice from Consumer Direct, a DTI-backed agency, at www.consumerdirect.gov.uk.

Gordon Laing

gordonl@pcw.co.uk

Breathing new life into a fading market

As digital SLRs come down in price, Gordon Laing doubted anyone would spend big bucks on an all-in-one – until he saw Sony's R1

I f you're into photography and have around £600 to spend on a new camera, naturally you'd think first about buying a digital SLR, right? The latest breed of budget models (as reviewed in our group test in the December 2005 issue) combine the quick handling, fast focusing and interchangeable lens flexibility of traditional SLRs, with the digital benefit of instant playback.

While admittedly still appreciably more expensive than most traditional film SLRs, this combination of power and flexibility has seen digital SLRs become some of the best-selling cameras on the consumer market. Indeed, once street prices started to fall below £700, they forced the existing high-end all-in-one category to much lower price points.

So in this current market you'd think a new all-in-one costing £699 simply wouldn't stand a

'In many ways Sony's Cybershot DSC-R1 makes digital SLRs look like dinosaurs'

chance against a budget digital SLR – yet this is exactly what Sony's just launched in the form of its Cybershot DSC-R1. So what's going on? Doesn't Sony know that people with £699 to spend on a new camera are much more likely to buy a digital SLR?

Speaking as someone who traded in their own high-end all-in-one – and a Sony model at that – for a digital SLR once they became affordable, I seriously doubted whether an enthusiast would go for anything else. But the R1 is unique in one crucial respect, which makes it different to existing all-in-ones and in many ways makes digital SLRs look like dinosaurs – namely, its image sensor.

When it comes to deciding between a high-end all-in-one and a digital SLR, most people weigh up the gizmos, gadgetry and big lens convenience of the former against the fast handling and interchangeable lens capability of the latter. But for me the real killer difference is the image sensor – and I'm not talking about the usual megapixel resolution.

The problem with the image sensors in all-in-ones is their physical size. They typically have at least five times less surface area than the sensor in

a budget digital SLR. Given the same resolution, the individual pixels on a digital SLR sensor are physically much larger, in turn allowing far lower noise levels, especially at higher sensitivities.

Noise can be seen on digital images as random grain-like speckles, especially in areas of shadows or flat colour such as a clear blue sky. If you've ever taken a picture at an ISO rating of 400 with an all-in-one, you'll know that noise can be a problem for many of these models. In contrast, digital SLR images remain considerably cleaner up to much higher sensitivities. For me the larger sensor and its resulting image quality is the killer advantage of a digital SLR.

And this is where Sony has scored, by developing a new sensor for the R1 which is the same size as those in budget digital SLRs. And just to rub it in, it has 10.8megapixels, too. While the R1's noise levels were slightly higher than typical digital SLRs in my informal tests, they were miles better than any other all-in-one I've seen to date.

Unlike conventional digital SLR sensors, the R1's sensors can deliver live video to its LCD screen, allowing it to be used for composition – and by fitting a flip-out LCD screen, it's far easier to shoot at the kind of angles a digital SLR would have you crawling upside-down on the floor for.

Ultimately, while I loved using the R1, I'm sticking with my digital SLR, simply because I need to swap lenses. SLRs are also easier to focus manually and, typically, have better continuous shooting capabilities for action shots. But if you mostly use auto-focus and are unlikely to buy (or don't already own) lots of lenses, the R1 is arguably a better bet.

The lens has a better range and is optically faster than those bundled with budget digital SLRs, while the flip-out screen encourages interesting compositions. Crucially, though, the large sensor allows you to shoot detailed, low-noise images with less of the dust concerns of a digital SLR.

This time last year I predicted the high-end all-in-one market would be killed by budget digital SLRs, but the R1 has successfully redefined the category. It will make enthusiasts think again about whether they really need a digital SLR. **PCW**

Guy Kewney

guykewney@gmail.com

Recycling – otherwise known as dumping

When you buy a new product, be careful how you dispose of the old one. Guy Kewney is shocked at what happens to some old PCs

It's like athletics, really. You think of yourself as fairly fit, being able to jog for an hour and cover five kilometres, and then you meet an elite distance runner who completed it in half that time and then ran back down the track to meet his friends and finish the distance with them, not even short of breath.

Similarly, people who don't play PC games tend not to realise just how good the best PC gamers are. Someone like the world-class gamer from the US known as Fatal1ty (his real name is Johnathan Wendel) isn't just a bit better than you and I might be; he's on a different level. I still recall my first attempts at playing Quake, many years ago, and getting trashed by someone who, a year later, I absolutely destroyed – he got only two frags in, to my 20. Then I met

'As much as 80 per cent of what is "collected for recycling" is offered to poorer countries'

a minor gaming clan celebrity online and I didn't get a single shot on target. And even they wouldn't get to score if they were playing against Fatal1ty.

So when Fatal1ty endorses a motherboard (see our review in the December issue), you can take it from me (and the *PCW* Labs) that it's a remarkable motherboard – and so is the heatsink and fan that goes with it. It's well worth upgrading to if gaming's your thing.

But where do you dump your old motherboard, assuming it's not fit to be re-used in a PC? I'm horrified to discover that the people who claim to 'recycle' your old PC are not necessarily doing anything of the sort.

An old, discarded PC is, in simple terms, a toxic hazard. Dump it in landfill, and several really unpleasant chemicals can leach out into the biosphere. Within 10 years, people will be living on those landfill areas, planting carrots and potatoes and other home-grown fresh vegetables. So you do need to send the dead beast to someone who knows how to safely extract and dispose of the toxic bits.

The thing is, the cost of doing that is high, and under current EU (and American) law, the eventual cost is charged to the makers of new machines. Unless, of course, they can magically make the machines disappear at the end of their working life.

And this is where I was aghast to discover the shysters operating. You don't have to take my word on trust, or that of the newspaper reporters who have written about it: go to the horse's mouth at the Basel Action Network (BAN) (www.ban.org) and search for 'digital dump' – here you'll find that what the world's media has reported is just a tiny part of the truly awful story.

What these 'recyclers' do is simply to send all the techno-junk to Africa and India, claiming that they are bridging the digital divide. BAN's figures suggest that as much as 80 per cent of what is ostensibly 'collected for recycling' is offered to poorer countries as a way of helping them.

In fact, when the machines get to Third World markets they often end up on landfill anyway – they're useless. Those old beasts chew power, which poor people can't afford; and they break down, requiring expensive parts that are not available. So they end up tipped over railway embankments. Because, of course, among the 'luxuries' that these cash-strapped economies can't run to, we also have to list advanced materials recycling facilities and waste recovery plants.

This may seem like a cunning plan to you. You may well take the view that these Third World countries have problems, but that they are their problems for them to sort out, not ours.

The last time I checked my local supermarket, I noticed that an awful lot of our food is grown in these Third World countries. You may think you're smart avoiding the cost of sending your old microcomputer to a professional recycler, but you might want to reconsider just how smart that decision was when, in 20 years, you're diagnosed as having long-term mercury or cadmium poisoning. It might seem less cunning then... and Fatal1ty may resonate with a deeper meaning. **PCW**

Barry Fox

Help isn't always at hand

Knowing how to help consumers is key to good service, says Barry Fox, but how many manufacturers actually care?

barryf@pcw.co.uk

How lucky you are', some people say. 'You get to try new hardware and software without paying for it.' If only they knew.

All my workhorse PCs and peripherals have been bought with my own hard-earned cash. No-one can say: 'We are collecting what we loaned you, have it ready this afternoon.' Some other stuff I use is on loan, often long-term, because I refuse to pull my PC apart to fit something that will very likely still not be working properly by the time the company asks for it back.

I am currently three months into trying to find out why the fax software that comes with Lexmark 2300 series all-in-one printers won't trip the auto-answer on a Brother fax machine. We do at least now know why Lexmark's support engineers couldn't replicate the problem. They have been using a newer version of the software.

'Some vendors say thanks for the feedback, others just wish I would drop dead'

Why waste time on this kind of goose chase? Because it gives me a wonderful opportunity to tell readers how the manufacturers react. Some say thanks for any feedback and make better products. Other just wish I would drop dead.

Lexmark is saying thanks. I am not sure yet about HP.

HP's Lightscribe system burns graphics into the label side of special disc blanks. The system has been slow to catch on and I only recently got a drive to try, the new HP 840i.

I ripped the existing drive out of a Dell Dimension and slotted in the 840i. The ribbon cable and power lead would not reach because the HP drive is shorter than every other half-height drive I have ever used. HP obviously knows this may cause trouble because the instruction sheet talks about the need to 'buy a longer cable'.

'Why have you changed the drive size?' I asked HP. 'At least put a warning on the box or offer a short extension lead.' So far HP has not replied. So I'm warning you to check cable length before fitting.

Norton Goback can rescue a PC's filesystem when Windows Restore fails to restore – which Restore often does just when you need it most. But Norton flatly refuses to work on one of my Dells. It doesn't have Dynamic Disk Overlay software, but Goback thinks it does.

Symantec's knowledgebase offers no useful help. Asking Dell's helpline was as much use as asking a pet parrot to recite nursery rhymes.

A knowledgebase can only deal with known issues, but there is now no way of emailing Symantec to report a bug. 'We were being swamped,' says Symantec.

So how can the knowledgebase help with new problems? 'We learn about new problems through the pay helpline', says Symantec. So unless someone pays Symantec $30 'per incident' to report a problem, the knowledgebase can't offer free advice on a fix. Nice one, Symantec.

Anyone who uses several different keyboards will know how infuriating it is to find some of the keys in different positions. So when Microsoft launched the latest range of keyboards, I jumped at the chance of talking to the chap who describes himself as Microsoft's Ergonomist and User Researcher.

'We studied 350 families in the USA and took 10,000 pictures. We also did Focus Groups to find out what people like,' he explained as he unveiled four new desktop and Media Center keyboards. The first thing I noticed was that they were all different.

One has three sets of four Function/Shortcut keys, one has four sets of three, another has one set of 12 and the fourth has one set of five and one set of seven.

Why?

'There is no specific reason,' says Microsoft's Ergonomost. 'It's not something that has come up before. People don't use function keys much now anyway.'

There is only one thing that keeps me sane while struggling with PCs. I can listen to music or radio or half watch TV. If I had fallen for the Microsoft hype and made a Media Center PC the source of my entertainment, I couldn't even watch and listen while twiddling thumbs during all those endless reboots. **PCW**

REVIEWS

WHAT'S NEW THIS MONTH

If there's one manufacturer you can rely on to produce a stylish PC, it's Shuttle. To coincide with Microsoft's latest update of its Media Center operating system, Shuttle has developed one of the most attractive PCs we've ever seen. However, the big difference between this Media Center and most others is that it uses a Pentium M processor. Running far cooler than standard desktop processors, it means you don't need a noisy cooling system, which is perfect for a PC that sits in the lounge. Under the spotlight in our group tests are six of the latest photo printers, the best home-theatre PC software, £1,200 PC bundles and GPS software. Other highlights include Canon's latest Powershot digicam and Steve Jobs' new baby – the Ipod that plays video.

CONTENTS

Prices include VAT unless otherwise stated

OUR SCORING

Excellent ★★★★★   Very good ★★★★☆   Good ★★★☆☆   Below average ★★☆☆☆   Poor ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.

Recommended: A product that combines great features, usability and value for money.

Great Value: Not the best in class, but a product that has superior features and performance for the price.

The business awards are used for products that are more suited to home offices or small businesses.

Personal Computer World EDITOR'S CHOICE
Editor's Choice

Personal Computer World RECOMMENDED
Recommended

Personal Computer World GREAT VALUE
Great Value

Personal Computer World BUSINESS EDITOR'S CHOICE
Editor's Choice
Business

Personal Computer World BUSINESS RECOMMENDED
Recommended
Business

Personal Computer World BUSINESS GREAT VALUE
Great Value
Business

'The advent of compact photo printers allows digital camera users to create a developing lab in their own home'

MEDIA CENTER PC
Shuttle M1000

Style and technical prowess give Media Center a much needed boost

I f anyone's going to make a PC that's stylish enough to sit in your lounge, it's Shuttle. More famous for its small form factor barebones PCs, Shuttle has launched the M1000 PC.

The glossy black case and slimline design combine to create a truly mouth-watering system – unmistakably Shuttle. Our only complaint is that the green LED looks a little dated – a full-on LCD screen would have made it look so much better. But there's no getting away from the fact that it's still one of the best-looking Media Center PCs money can buy.

Since a Media Center PC is designed to sit in a lounge environment, it is vitally important to limit the amount of noise it makes. Shuttle has taken this matter seriously and opted for a Pentium M processor. Previously only found in notebooks, the Pentium M runs far cooler than standard desktop processors. You might get a shock when you first turn on the M1000, as you're greeted with what sounds like a plane taking off. However, after a couple of seconds it calms down and is barely audible from then on. You certainly wouldn't be able to hear it whirring away while watching a film or listening to music.

The downside of the Pentium M processor, especially the 1.73GHz model here, is that it lacks the raw power of desktop CPUs. Shuttle also supplies just 512MB of memory to support the processor. Although neither the low processing power nor memory will be a problem as far as Media Center is concerned, it will hamper performance in the latest games and high-end applications. But the M1000 is designed as a Media Center PC, not a high-end gaming system.

Taking care of the tuning side of things are two separate Avermedia TV tuners. Our model had two analogue tuners but, if you live in a Freeview area, digital alternatives are available for the same price. Shuttle could have saved space by opting for a single dual-tuner card and therefore opening up the opportunity to upgrade to four tuners (using two dual-tuner cards). Although Media Center doesn't currently support more than two tuners in the UK, in the US it can handle four (two high definition and two standard tuners). When we eventually get high definition broadcasts you can expect Media Center to be updated appropriately. That said, the two tuners

The sleek and slimline design would make the M1000 a great addition to your lounge

All about Media Center

Media Center is Microsoft's attempt to be the basis of your home-entertainment setup. Based on Windows XP Professional, it features a wealth of home-entertainment functionality including the ability to watch and pause live TV, schedule recordings and, as long as you've got two tuners (as with the M1000), record two shows at the same time just like the Sky+ box. It will also happily serve as your hifi (playing a range of audio formats), DVD player, photo viewer and much more. Using Media Center Extenders, you can even stream content from your Media Center PC to other TVs and speakers over your home network, either wired or wirelessly.

Microsoft recently released a new update to its entertainment operating system. Indeed, Shuttle delayed the launch of the M1000 so it could include the latest version, known as Update Rollup 2. New features include support for the Windows Media Center Extender for Xbox 360 and external DVD changer support. You can read more about the new features of Media Center Update Rollup 2 in our Home theatre software group test on page 91.

Pausing live TV and scheduling recordings is easy

used by Shuttle feature both hardware acceleration and onboard mpeg encoding, which reduces the load on the relatively slow mobile processor.

An Nvidia Geforce 6800LE graphics card with 256MB of Ram handles the graphics. This card will be able to run the latest games, though not at high resolution and detail settings. Like the Pentium M processor, it will be perfectly adequate for Media Center applications.

Various video outputs are provided and, if you've got a compatible TV, the component option will give you the best quality. Alternatively, S-video and composite are available along with DVI and VGA outputs. If you want to use Scart, you'll need to buy a suitable converter (around £10). Audio is taken care of by S/PDIF connectors (optical and coaxial) along with a 7.1 output. Microphone and headphone sockets are hidden behind a flap at the front, which also houses a multiformat memory card reader.

The 250GB 7,200rpm hard drive provides the bare minimum of storage space for a Media Center PC, but if you really get into the swing of recording video you will end up wanting more. To help you out, Shuttle has included a secondary storage option in the form of a front-loading 2.5in drive bay. A USB caddy means the drive can be used just like a USB key – useful if you want to transfer video to and from the M1000 without getting bogged down with wireless streaming. The standard M1000 package doesn't come with a 2.5in drive, but you do get the caddy so you can add your own at a later stage.

While on the subject of storage, it's a shame Shuttle could only find room for a single-layer DVD drive. Don't be fooled by the 'Dual-layer support' claim on the website; this means it can read dual-layer discs and you'd be hard pushed to find an optical drive that can't do this. On the plus side, it is a particularly quiet drive.

The wireless keyboard complete with a trackball is small, lightweight, and perfect for controlling things from afar and when not in use, you can tuck it under your sofa. A small power button on the keyboard

sends the system into its Away Mode – a new feature with Media Center. In this state, the M1000 will still record programmes and stream content to Media Center Extenders. It then takes less than two seconds for the system to leap back into life. However, when we measured the wattage we weren't too impressed. When turned on and running Media Center, the M1000 was drawing between 75 and 77w. While in Away Mode, this dropped to around 70-74w – hardly what we'd call power saving. If you use Windows Stand-by mode it drops down to just 11w, but you then lose all Media Center functionality and it takes around 15 seconds to fully resume.

In a further attempt to differentiate the M1000 from other Media Center PCs, Shuttle has gone for its own version of the Media Center remote control. It's more compact than the Microsoft device and features the same black livery on the back of the controller as on the case.

In the past, although we've raved about its attention to detail and stylish designs, we have often criticised Shuttle for overpricing. Sadly, the M1000 is no different. £1,422 is a lot to spend on a PC that comes without a monitor or surround-sound speakers. Shuttle will argue the specially designed case and use of the expensive Pentium M pushes up the price, but we still feel it's too costly – not outrageously so, but we expected it to be around £200 cheaper.

There's plenty to like about the M1000. It's small, stylish, extremely quiet and well designed. On the downside, the lack of a dual-layer DVD burner, unconvincing power-saving mode and, most importantly, high price tag go against it, but there's also a problem that Shuttle can do little about – Media Center itself.

Microsoft appears committed to Media Center, as do a large number of PC manufacturers, and it's not hard to see why. Intuitive menus, very few bugs and plenty of functionality is just what you want from a PVR (Personal Video Recorder). The problem lies in persuading the average home user to throw away their video recorder and DVD player and replace it with a Windows-based PC; something they've probably had a fair share of bad experiences with in the past. Only time will tell whether Microsoft achieves its vision of a PC in every lounge, but Shuttle releasing the M1000 will have done its cause no harm at all. *Will Stapley*

Shuttle's remote control is more compact than the Microsoft version

The M1000 has a wide range of connectivity options

DESKTOP COMPUTER
Apple Imac G5
A powerful and versatile alternative to a PC at a good price

RECOMMENDED
Personal Computer World

Microsoft hasn't had much success getting us to buy Media Center PCs for our front rooms, but Apple is clearly hoping for more luck with its latest version of the Imac.

In technical terms, this is a relatively minor upgrade. The £899 model, pictured above, has a 17in screen and 1.9GHz PowerPC G5 processor (roughly comparable to a 2.5GHz Pentium 4). The all-in-one chassis is slightly thinner and the graphics card has been boosted to a Radeon X600 Pro. There's also a

£1,199 version with a 20in screen that runs at 2.1GHz. More interesting is that a webcam has been built into the upper edge of the screen, and software called Photo Booth lets you take pictures and muck about with special effects.

The real step forward, though, is revealed when you look at the dinky remote control included with the Imac. This allows you to launch a new piece of software called Front Row, which can then be used to remotely control and play any music, video or photo collections stored on the Imac.

It's not exactly a startling innovation, but Apple's strength, as always, lies in its ability to make products that are easy to use and uncomplicated. Front Row works extremely well and the Imac's little remote control has a mere six buttons compared to the button-festooned models provided with many Media Center PCs.

We're still not convinced that many people will really want either an Imac or a Media Center PC in their living room but, even so, the Imac still stands on its own merits as a great home computer. It's elegantly designed, competitively priced and includes an impressive combination of hardware features and bundled software.

Cliff Joseph

Details
Price £899
Best price www.pcw.co.uk/bestprices
Contact Apple 0800 039 1010 www.apple.com/uk
Specifications 1.9GHz PowerPC G5 processor • 512MB of Ram • 160GB hard disk • ATI Radeon X600 Pro 128MB • 802.11g • Bluetooth • 2 Firewire • 3 USB2 ports

Verdict
Pros Well priced; decent hardware and software
Cons Lacks internal expansion slots
Features ★★★★★
Performance ★★★★☆
Value for money ★★★★★
Overall Front Row is just eye candy, but the Imac is a powerful and versatile home computer at a competitive price
★★★★★

GAMING NOTEBOOK
Evesham Voyager C720
Desktop-standard 3D graphics on the move

RECOMMENDED
Personal Computer World

Evesham's Voyager C720 is the first notebook we've seen that uses the mobile version of Nvidia's Geforce 7800 GTX graphics card – arguably the fastest graphics adapter on the market.

Obviously there are several hurdles in transplanting the desktop part to a notebook PC, but remarkably the Geforce Go 7800 GTX hasn't lost much in the transition. It still uses eight vertex shaders and 24 pixel shader pipelines – just like its big brother.

The only real compromise is its clock speeds. The full desktop part has a GPU and memory clocked at 430MHz and 1,200MHz respectively, whereas the

mobile edition's components run at 400MHz and 1,100MHz – much like the desktop Geforce 7800 GT.

The Voyager C720 uses a 17in widescreen display. Unfortunately the screen has a native resolution of just 1,440 x 900, so it can't fully exploit the performance of the graphics card. Evesham sells a version of the Voyager C720 with a 1,680 x 1,050 display, but this costs over £200 more. Despite its comparatively limited resolution, the Voyager C720's gaming performance is the highest we've ever seen in a notebook. It achieved a 3Dmark05 score of 6,833 and ran Far Cry at 70 frames per second.

Performance in everyday applications wasn't quite as mind-boggling. The 2.1GHz processor and 1GB of DDR memory helped it achieve 180 in our Sysmark 2004 SE tests, which is on par with other similarly equipped Centrino notebooks.

Importantly for a desktop replacement system, the Voyager C720 has a very comfortable keyboard with a dedicated numeric keypad, but unfortunately the mouse touchpad is unresponsive at times.

This is the fastest gaming notebook available. It isn't as attractive as the Dell Inspiron XPS II (*PCW* September 2005), but if you want uncompromising 3D performance it's an excellent choice. *Rory Reid*

Performance
Sysmark 2004 SE: **180**

0	100	200	300

3Dmark05*: **6,833**

0	5,000	10,000	15,000
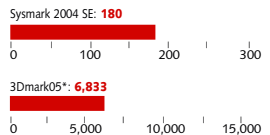
*Tested at 1,024 x 768 in 32bit colour

Details
Price £1,348.99
Best price www.pcw.co.uk/bestprices
Contact Evesham www.evesham.com
Specifications Intel Pentium M 770 • 1GB DDR2 Ram • 256MB Nvidia Geforce Go 7800 GTX • 17in monitor (1,440 x 900) • 80GB 5,400rpm hard drive • Dual-layer DVD • Windows XP Home • 397 x 293 x 45mm (w x d x h) • 3.8kg

Verdict
Pros Excellent gaming performance
Cons Limited screen resolution
Features ★★★★★
Performance ★★★★★
Value for money ★★★★☆
Overall The fastest gaming notebook bar none, but lacks the style of some of its rivals
★★★★☆

DIGITAL CAMERA
Canon Powershot S80

Expensive yet feature-packed 8megapixel compact

Canon isn't shy when it comes to releasing new digicams. One year after the Powershot S70 hit the shelves, its successor, the Powershot S80, is now available.

Smaller and lighter than the S70, the S80 has a retro look to it, thanks mainly to the faux-leather design on the right hand grip. Sliding open the lens cover kicks the 3.6x zoom lens into action while a stunning 2.5in LCD viewfinder takes up the majority of the rear of the camera.

Equally impressive is the four-way control pad that doubles up as a scrollwheel, which lets you whizz through the menus.

Just like Konica Minolta's Dimage X1 (reviewed in *PCW* December 2005), ithe S80 houses an 8megapixel CCD. Another similarity between these two cameras is the amount of image noise exhibited, especially with indoor shots. However, in well-lit conditions we managed to get some decent results – colours were accurate and exposure was spot on.

You will only really notice the noise when cropping in on detail or creating extra-large prints. But it could be argued that if you're not going to do either of these, why opt for an 8megapixel camera?

Canon has dropped support for raw files, which will disappoint enthusiasts, but both shutter and aperture priority are available along with a full manual mode. You can also fiddle with ISO speeds, exposure compensation and view a live histogram.

The movie mode is capable of capturing films at a sizeable 1,024 x 768, but only at 15fps (frames per second). If you want smooth-flowing 30fps movies you'll need to drop to 640 x 480.

The Canon Powershot S80 might be expensive, but you do get a lot for your money. The range of manual features will entice those who want to get creative while the build quality and overall design is top-notch.

Will Stapley

Details
Price £499
Best price www.pcw.co.uk/bestprices
Contact Canon 08705 143 723 www.canon.co.uk
Specifications 1/1.8in CCD • 8megapixels (3,264 x 2,448) • 3.6x optical zoom, 28-100mm (35mm equivalent) • f2.8-5.3 • 2.5in LCD • 1,024 x 768 movie mode (15fps) • 104 x 57 x 39mm (w x d x h) • 225g

Verdict
Pros Sturdy design; good range of features; image quality
Cons No raw mode; noisy in low light; overpriced
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆
Overall It's not cheap, but the Powershot S80 offers a good selection of features and takes decent shots
★★★★☆

PORTABLE MEDIA PLAYER
Apple Ipod

Tiny, fifth-generation device with video, but don't expect to watch movies

When he unveiled the new video-playing Ipod, Apple supremo Steve Jobs said, 'This is the best Ipod for music ever, and customers basically get the video for free'. That's the key to the new Ipod. It's not meant to be a portable TV or video player, but a really good mp3 player with a bit of video thrown in as an added bonus.

In order to view video, the Ipod has a slightly larger screen than before, with a resolution of 320 x 240 and measures 2.5in diagonally. However, it is smaller than previous Ipods in overall terms, thanks to the use of a more compact internal hard disk.

There are two models available, 30GB and 60GB, and you can also choose between white or black (the black Ipod nano is far more popular than the white one). Apple says the 30GB model can store 7,500 songs or 75 hours of video and twice that for the 60GB model.

Critics have argued that no-one will want to watch hours of video on a screen that small, but that rather misses the point. Apple isn't suggesting you watch the entire *Lord of the Rings* trilogy on the Ipod. The idea is you just buy a few music videos from the Itunes store and use them to pass the time on the train to school or work in the morning. And, of course, you can still use it to listen to endless hours of music as well.

Watch out for the battery life, though, as playing video cuts the battery time down from almost 14 hours to just two. In other words, the new Ipod is pretty much what Apple says it is – a very good music player that also plays a bit of video. If you want to watch movies on the go, take a look the Enza Portable Media Center on page 51.

Cliff Joseph

Details
Price 30GB: £219, 60GB: £229
Best price www.pcw.co.uk/bestprices
Contact Apple 0800 039 1010 www.apple.com/uk
Specifications 2.5in screen • 14hrs max battery life (2hrs video) • Audio: aac, mp3, wav • Video: Mpeg4, H.264 • USB2 • 61 x 14 x 101mm (w x d x h) • 157g

Verdict
Pros Attractive; compact; video
Cons Small screen; poor battery for video
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆
Overall Still one of the best mp3 players, but the video appeal is limited
★★★★☆

HOME SURVEILLANCE
Motorola Homesight
Monitoring your home for intruders is made easy

With its Homesight kit, Motorola is bringing home surveillance to the masses. Among other goodies, the package consists of an access point (called the System Controller), camera and door sensor, all of which are wireless.

Installation is a snip as the System Controller automatically detects nearby Homesight equipment. The access point hooks up to your PC via a USB connection and will only communicate wirelessly with other Homesight kit. The software is reasonably easy to use and lets you set up activation times and alerts. If you're in a crowded wireless environment, you may have trouble locating a free channel for the access point to use.

Should some miscreant trigger the door alarm or sensor on the camera, you'll be notified either by text message or email – the latter allowing for a video clip to be attached. Image quality isn't great, but the fisheye lens can capture wide areas.

In choosing not to get bogged down with integrating the kit with your current network, Motorola has made Homesight both easy to set up and use. Unfortunately, it also means it won't interact with your wireless router. As a result, your PC needs to be on all the time and you'll have to resort to remote access services to monitor and adjust settings over the Internet.

Homesight is a good choice if you're after basic home surveillance that's easy to install and the range of add-ons, such as temperature and water sensors, also work in its favour. But if you're willing to get a little more technical, we'd recommend opting for a network camera, such as the ones reviewed in *PCW* November (page 94).   *Will Stapley*

Details
Price £299.99
Best price www.pcw.co.uk/bestprices
Contact PC World 08702 420 444 www.pcworld.co.uk
Specifications Wireless System Controller • Wireless camera (video and audio) • Wireless door/window sensor • AC extension adapter for wireless camera • Wall-mounting kit USB connection to PC • Broadband required for email/SMS notification

Verdict
Pros Easy to install; accessory range
Cons Limited functionality; requires your PC to be on
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall Easy to set up and operate, but the lack of integration with your network holds it back
★★★★★

MOBILE PHONE
T-Mobile MDA Pro
The most sophisticated handheld around

The T-Mobile MDA Pro is the fourth-generation PDA in the MDA product family. Unlike the smaller MDA Compact, its physical design has more in common with a laptop than a traditional PDA.

It is shaped like a notebook PC with one half of the unit housing a full Qwerty keyboard and the other a touch-sensitive display. The screen can be rotated 360º and folded against the keyboard like a convertible tablet PC, but the hinge isn't particularly strong and, on our model, became a little loose.

One could argue the MDA Pro is too big, at 132mm widex 22mm high, and weighs a rather hefty 210g, but if it were any smaller it would be too fiddly to use.

The MDA Pro can be used as a tri-band mobile phone, is 3G-ready and has an integrated 802.11b wireless adapter so you can get online at Wifi hotspots. It will also function as a wireless modem if you connect it to your notebook or PC via Bluetooth or a USB cable.

If you work on the move, the MDA Pro could well be a substitute for your notebook PC. Its keys are fairly large, which allowed us to write this review on it quite easily. It also supports Push email technology, so your Pop3 email messages can automatically be sent to the handset as they arrive.

Another neat touch was its 48MB of non-volatile memory – this reduces the chances of data loss should the battery die.

The MDA Pro's only real flaw is its conspicuous size when used as a mobile phone – you'll get a few strange looks when you hold the device flat to your ear. A hands-free kit is included and we'd recommend using it but, on the whole, the MDA Pro is difficult to fault.   *Rory Reid*

Personal Computer World RECOMMENDED

Details
Price From £139 (depending on contract)
Best price www.pcw.co.uk/bestprices
Contact T-Mobile 0845 412 2401 www.t-mobile.co.uk
Specifications 520MHz processor • 1.3megapixel camera • 640 x 480 touchscreen TFT • 3G • Push email • 802.11b • Bluetooth • UMTS • MMC/SD memory cards • 48MB of Ram • 132 x 79 x 22mm (w x d x h) • 210g

Verdict
Pros Usability; plenty of features
Cons Bulky; weak hinge on screen
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall Despite its size and weight, the MDA Pro is an excellent all-round handheld
★★★★★

NETWORK STORAGE
Netgear SC101 Storage Central
Put your old hard drives to good use

I f you have performed a few PC upgrades in the past, there is a good chance you have some old hard drives knocking around. With the SC101 Storage Central, you can resurrect up to two drives to provide storage for your home network.

The advantage of network storage is you don't need a specific PC to be turned on to access the data. But, unlike most other network storage devices, the SC101 requires a client to be installed on each PC in your network. It's also Windows only. Moves are being made to rectify the latter, but for now Mac, Linux and other non-Windows users will be disappointed.

There's nothing technical about the hardware installation. Open up the case, slot in your drives and hook up the cables. A wizard is included to get everything set up on the software side.

Sadly, the SC101 doesn't run any media streaming software, nor is it UPnP compatible. We can't help feeling Netgear missed a trick here, especially since Netgear has an audio streaming device in the form of the solid-performing MP101. As it stands, you will still have to have a PC turned on to feed the MP101, or any other streaming device, with content.

The fact that the SC101 doesn't have a fan and is only passively cooled may cause trouble when using two fast hard drives. Although we didn't experience any such problems during our testing, the Netgear support forums tell a different story. We've also heard reports of certain drives not being compatible, so we'd advise you to check with Netgear before you buy.

The SC101 does what it sets out to do, and at a good price, but Netgear would do well to iron out the various problems, especially the operating system support. Once it does this, the company will have a very attractive product on its hands. *Will Stapley*

Details
Price £99
Best price www.pcw.co.uk/bestprices
Contact Netgear 01344 397 021
www.netgear.co.uk
Specifications Supports two 3.5in IDE Parallel ATA hard drives • 10/100 Lan (Ethernet cable included) • Smartsync Pro backup software • 1yr warranty • 108 x 171 x 144mm (w x d x h)

Verdict
Pros Easy to use; makes use of old drives
Cons Passively cooled; Windows only; no media streaming
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★
Overall A good way to make use of old hard drives, but various issues hold it back
★★★★★

PHONE HANDSET
Cordless VoIP/Dect Dualphone
Make calls over the Internet without being tied to your computer

F ree PC-to-PC calls via services such as Skype are becoming popular, but their main disadvantage is that your computer must be on, and you must be in front of it to make calls. Bluetooth headsets give you greater freedom, but are no substitute for using a normal phone.

The USB Cordless Dual Phone is a Dect handset that can make and receive calls over both the Internet via Skype and traditional carriers such as BT.

It is easy to set up; you just plug a telephone line into the base unit, which is also connected to a spare USB port, load the software; the phone is then discovered and you are ready to make calls. The whole process took under five minutes, helped by the simple instructions.

To make Skype calls, ensure the service is working on your PC – the phone will find whichever account is logged on. The handset displays all contacts currently online so you simply scroll to the name you want, hit the green button marked PC and the call is made. Call clarity over both Skype and BT is excellent, even when some distance from the base unit.

You can set different ring tones for incoming Skype or BT calls and use it for making Skype Out, landline or mobile calls. It will also receive Skype In and Skype conference calls, the only element that is missing is instant messaging using the keypad.

It's a great phone that's really easy to use and allows you to make free or low-cost Skype calls or normal BT landline calls, wherever you are in your home. Our only gripes are its cost and that you are restricted to using Skype for Internet calls. But, if you are already a Skype user or contemplating signing up, it's worth the money. *Rob Jones*

Personal Computer World RECOMMENDED

Details
Price £80
Best price www.pcw.co.uk/bestprices
Contact New Tech Products www.new-tech-products.co.uk
Specifications Requires Skype account (free) • Dect compliant • Caller ID • Address book • Five ring tones • Ni-MH battery pack • 6.5 hours talk time • USB interface

Verdict
Pros Call clarity; flexible; easy to use
Cons Tied to Skype; cost
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★
Overall A great phone for heavy Skype users who want freedom from their PC
★★★★★

GRAPHICS TABLET

Wacom Graphire4 Studio XL

A pen input tablet for easy and intuitive photo editing

Wacom has been producing pen tablets for designers and graphic artists for many years, but its Studio range of Graphire4 tablets signals a change of focus by aiming squarely at home users who want an easy and intuitive way to edit photos.

The Graphire4 range is available in XL (A5) and Standard (A6) sizes, although the desktop footprint is much larger than the nominal active area – for example, the A5 tablet reviewed here takes up almost the same area as an A4 sheet.

All the Studio models come with image-editing software – Photoshop Elements 3 plus the filter plug-in Nik Color Efex Pro 2 Standard. Lower-priced Classic models are also available and these come bundled with Corel Painter Essentials 2 painting/illustration software.

Installation of the Windows driver was refreshingly simple and there's a very useful mini-tutorial that pops up when you've completed installation. Drivers for both Windows and Mac OSX are included.

The tablet is very easy to use once you've got used to holding the pen slightly above the table for cursor navigation, but then touching the tablet when drawing.

There are two programmable mouse buttons and a scrollwheel on the tablet to save you constantly scrabbling for your mouse – the pen itself also has two programmable buttons on the barrel.

The pen incorporates Wacom's pressure-sensing technology, which in suitable applications lets you adjust the size of the brush by simply pressing harder on the pen; a much more natural way of editing.

It's a passive cordless pen, so it requires no batteries, and the tablet itself is powered via the USB1.1 interface. The tablet is protected in use by a removable and replaceable transparent acrylic casing.

It's not cheap, but it is good value when you consider the bundled software and it's much more rewarding to use than a mouse for beautifying your favourite photos.
Kelvyn Taylor

Details

Price £179.99
Best price www.pcw.co.uk/bestprices
Contact Wacom
www.wacom-europe.com
Specifications Cordless pen • 2000dpi • USB1.1 • Windows 98 or higher • Mac OSX 10.2.8 • 278 x 264 x 18mm (w x d x h) • 500g

Verdict

Pros Easy to install and use; great software bundle
Cons Difficult to use for cursor navigation
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall If you find using a mouse restrictive, unleash your creativity with this excellent and intuitive solution
★★★★☆

MULTIFUNCTION DEVICE

HP Photosmart 2575

An expensive, but sturdy and high-performing printer, copier and scanner

The HP Photosmart 2575 feels like a cut above the average inkjet multifunction device (MFD). While many MFDs suffer from being more than a little flimsy, this one is sturdily built. A multiformat memory card reader (Memory Stick, SD, Compact Flash and Microdrive) sits at the bottom of the printer along with a Pictbridge-compatible USB port.

Installation and setup were simple and operation is similarly easy. On the top right of the printer sits a sizeable 6.4cm colour LCD screen that allows you to preview photos before you decide to print. A range of other controls are positioned to the left of the scanning bed and provide quick access to functions such as copy and scan, as well as emailing or sending the image straight to a designated photo-editing program.

During testing, we found the quality of the scanner to be commendable and speedy, taking just 20 seconds to scan a colour A4 page at 300dpi. Print quality is equally impressive. We managed to achieve 6.6ppm (pages per minute) for text, although this dropped to 3.14ppm for a pdf file containing both graphics and text. As is the case with most printers these days, borderless photo prints are available. What's not so common is an MFD that is capable of producing reasonably high-quality photo prints. We didn't notice any speckling or banding, which is highly unusual with MFDs.

Realising home networks are commonplace, HP has taken the sensible decision to include an Ethernet port with the Photosmart 2575. This means you can attach it direct to your router and print from any PC on the network.

This is one of the more expensive MFDs, but if you're after high-quality prints and a decent range of features the HP Photosmart 2575 is well worth the extra money.
Anthony Dhanendran

Details

Price £150
Best price www.pcw.co.uk/bestprices
Contact HP 0845 270 4142
www.hp.com/uk
Specifications HP Thermal Inkjet • 4,800 x 1,200dpi optimised printing • 1,200dpi scanning (19,200dpi optimised) • 48bit colour • Memory card reader • 100/50 input/output tray • USB2 • 440 x 284 x 172mm (w x d x h) • 5.5kg

Verdict

Pros Good quality; solidly built
Cons Reasonably expensive
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall The price is high, but in return you get decent scans and prints, along with networking
★★★★☆

COLOUR LASER PRINTER
Lexmark C524
Part of a quality range that can help small businesses reduce their costs

EXCLUSIVE

Part of a new range from Lexmark, the C524 is aimed at small businesses wanting high-quality colour printing without spending a fortune. Its compact, upright design gives it a conveniently small footprint while simultaneously bringing the control buttons and LCD screen to a more comfortable height. Descriptive, plain-English menus make operation relatively simple.

The new range comprises two main models, each of which is available in a number of different specifications. With a price of £349, the entry-level C522n comes with a 312.5MHz processor, network and USB connectivity. Starting at £419, the C524 range boosts performance with a 500MHz CPU and adds a 100-sheet multipurpose input tray. At the top of the range, the C524dtn has an additional 500-sheet tray and automatic double-sided printing and costs £809.

Based on a single-pass design, the C524 prints up to 19 pages per minute in both colour and monochrome in true 1,200 x 1,200dpi (dots per inch). Photographic colour-reproduction quality is also impressive, thanks to the 2,400 x 6,00dpi mode.

If you're worried about the cost of running a colour laser you'll be pleased to see Lexmark has put a great deal of effort into reducing running costs. Toner cartridges are available with 5,000- or 8,000-page yields, allowing you to choose either a lower purchase price or lower cost per page. High-yield cartridges cost £99.18 for each colour and £95.43 for black.

To help you keep track of costs, Lexmark's coverage estimator will calculate the amount of each toner used on any given page and the Colorsaver mode saves up to 50 per cent of colour toner on the page. You can also lock the printer into mono-mode, so only authorised users may print in colour.   *Paul Monckton*

Details
Price £419
Best price www.pcw.co.uk/bestprices
Contact Lexmark 08704 440 044
www.lexmark.co.uk
Specifications Postscript 3 • 500MHz processor • 1,200 x 1,200dpi or 2,400 x 600dpi resolution • Single-pass colour technology • Up to 19ppm colour and mono • 65,000 page-per-month duty cycle • 1yr on-site warranty • 484 x 440 x 408mm (w x d x h) • 26kg

Verdict
Pros Small footprint; easy to use; good management
Cons Poor documentation for beginners
Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★★☆

Overall Powerful, highly configurable, helps keep costs down and has a competitive price
★★★★☆

SME SECURITY
Gsec1 Prodigy Pro
Affordable and intuitive security system for up to 10 computers

The Prodigy Pro is an Internet security management (ISM) system designed for small businesses with up to 10 computers. Similar to other products within this very competitive market, it provides an integrated security solution for the small to medium-sized business. What makes it stand out, however, is its insurance policy.

Indemnity protection cover insurance will pay out up to £5,000 if you become victim to a security breach resulting in a loss of earnings, as long as a certified engineer has installed the unit. Gsec1 is obviously confident in its product, and there is little the unit doesn't do on the security front. Firewall protection, intrusion detection system (IDS), anti-virus, email and content filtering, bandwidth management and much more are all included as standard. In addition, VPN (virtual private network) support for remote or branch offices is configurable and a range of alerts can be set up – you can be notified by email or SMS text message.

Set up and maintained through the Prodigy control centre software, it has an easy-to-follow wizard making it straightforward to connect to the device and register the unit. Each area has advanced controls allowing you to keep tight reins on the network. Additional software has to be installed onto each client for VPN and anti-virus protection.

The Prodigy Pro device is let down by the lack of wireless features, although Gsec1 hopes to incorporate wireless into the Prodigy Pro some time in 2006. ADSL2 support is also missing. Another drawback with this particular model is that it only supports a maximum of 10 users, which limits scalability. There are other models in the Prodigy range that support many more clients, but you'll have to shell out more for them.

Overall, it's a reasonably priced system that is crammed full of security features. By making it easy to set up and maintain, as well as offering indemnity protection cover, Gsec1 makes the Prodigy Pro very appealing for small businesses.   *Alex Arias*

Details
Price £365 (10-user licence)
Best price www.pcw.co.uk/bestprices
Contact Gsec1 0870 164 4010
www.gsec1.com
Specifications Firewall • IDS intrusion detection • VPN • Web and FTP filters • Bandwidth management • DMZ support • Internet content filtering • £5,000 indemnity protection

Verdict
Pros Easy to set up; Insurance as standard
Cons Lacks wireless; limited to 10 users
Features ★★★★☆
Performance ★★★★★
Value for money ★★★☆☆

Overall Lacks wireless and is limited to 10 users, but the indemnity protection and ease of use work in its favour
★★★★☆

MXL Desktop Recording Kit

Price £89.99 **Contact** www.yamaha-music.co.uk **Overall** ★★★★☆

Studio-class condenser microphones were, for a long time, too costly for non-professional use. Prices have fallen but most models use XLR connectors and require a 48v power supply, so cannot be connected directly to a computer.

The MXL Desktop Recording Kit, sold in the UK by Yamaha, gets round both problems by bundling a battery-powered mic with an XLR-to-miniplug adapter lead. You also get a 0.25in jack adapter, a mini-tripod stand, and a standard XLR cable that can draw external power if you switch off the mic's 9v PP3 battery.

MXL sees musicians or podcasters using the kit for recording with laptops on the road, but it is also a good choice for any PC (or camcorder) user who requires this class of input.   *Clive Akass*

Dream'eo Enza

Price £329 **Contact** www.dreameo.com **Overall** ★★★☆☆

Microsoft Portable Media Center (PMC) devices are few and far between, and the Enza is the latest to hit the shelves.

Despite its clever interface, we took exception to the physical shape of the Enza, which never felt right in our hands. The 3.5in screen (320 x 240 resolution) is of a good standard, but we were alarmed by its extreme sensitivity to touch. Even light contact resulted in pressure smudges that took several seconds to disappear.

With a 20GB hard drive, it can store around 80 hours of video, but battery life is disappointing at just three hours for video and six hours for audio.

The Enza isn't a bad device, but it is expensive. If you're after a portable video player, the Archos AV400 (see page 168) is cheaper and has far more features.   *Rory Reid*

ECS PF5 Extreme

Price £89 **Contact** www.pcnextday.co.uk **Overall** ★★★★☆

At first glance, the PF5 Extreme from ECS looks like a basic, featureless board. But don't be deceived by the amount of free purple PCB space.

The board is built around Intel's Socket 775 and 945P Express chipset and supports 1,066, 800 and 533MHz FSB CPUs, two x16 PCI Express graphics slots, up to 4GB of DDR2 memory, Serial ATA Raid and high-definition audio. The two PCI Express graphics slots let you attach up to four displays via two separate cards. The locking latch for both slots is small and, if you use large cards, almost inaccessible.

Considering the number of features, ECS has priced the PF5 Extreme very competitively.

Overall A well-priced board with plenty of useful features

Enermax Liberty Modular PSU

Price £70 **Contact** www.overclock.co.uk **Overall** ★★★★★

Most power supplies come with an excess of cables attached to them. If you don't use them all, they will hamper cooling unnecessarily.

With both Antec and AC Ryan offering similar PSUs, modular power supplies aren't a new idea. But what sets Enermax's Liberty series apart from the rest is the power outputs offered – 400, 520 and 620w.

Cooled by a single intelligently controlled 12cm fan, the PSU has a claimed efficiency of 80 per cent. Easy Plug grips come with the four-pin Molex connectors, making plugging and unplugging the connectors simple. Each Molex cable can be used for Parallel ATA or Serial ATA drives.

Overall It might not be a new idea, but the Liberty series adds some neat design touches and higher outputs

Gecube X850XT PE Uniwise AGP

Price £307 **Contact** www.lowestonweb.com **Overall** ★★★★☆

Although graphics card manufacturers might not like to talk about it, many people still own a PC with AGP graphics. If you're one of them and are feeling left out with all the recent hype over the X1800 and 7800GTX launches, the X850XT Platinum Edition Uniwise AGP from Gecube will still give you a decent frame rate in any game you care to mention.

Based on ATI's Radeon X850XT Platinum Edition core, the Gecube does away with the reference design two-slot cooling system. Instead, it uses Gecube's own single-slot Uniwise copper-based heatpipe cooling technology to cool the core. Clock speeds are 540MHz for the core while the 256MB of GDDR3 memory speeds along at 590MHz DDR (1.18GHz effective).

Overall Keeps the noise down while providing excellent performance

Zalman ZM-VHS1 and ZM-NB32K

Price NB32K: £6, VHS1: £3 **Contact** www.quietpc.com/uk **Overall** ★★★☆☆

A couple of small but useful new coolers from Zalman, the Korean masters of all things cooling. First up is the ZM-VHS1 – a small heatsink designed to cool the HSI (High Speed Interconnect) bridge chips in Nvidia's Geforce 6600 series of graphics cards. Unsurprisingly, Zalman recommends you use it with the company's own VF700 VGA Cooler for maximum cooling.

The ZM-NB32K could be the answer if you have a noisy northbridge cooler – standard northbridge coolers are usually attached to the motherboard by pushpins. Constructed from aluminium and just 32mm high, the ZM-NB32K is a passive cooler replacement designed for smaller cases. If you have room and want more cooling, the taller ZM-NB47J (£7) is available.

Overall Cheap and cheerful cooling options from Zalman
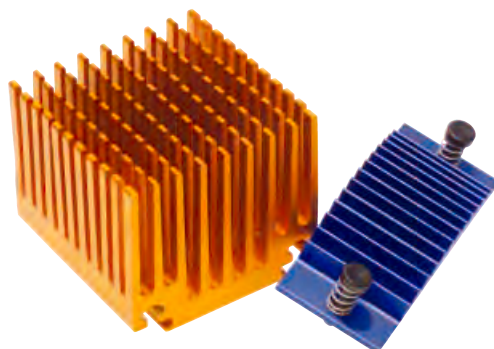
BAREBONES SYSTEM
Aopen MZ915-M
You can have the power and features of a desktop PC in a smaller package

Aopen is one of only a few companies to realise the advantages of using Intel's Pentium M mobile processor in a desktop environment. Thanks to its low power consumption, the Pentium M produces less heat and therefore requires less cooling, and the result is slower and quieter fans.

The company supports Pentium M on its motherboards and XC Cube barebones line-up. Both of these have been updated to use Intel's 915 chipset instead of the slower and less-featured 855 notebook chipset used previously. With the launch of the MZ915-M barebones system, this update has been

implemented in the Cube Mini range, too. The system supports all the latest 533MHz FSB Intel Pentium M CPUs, from the 730 (1.6GHz) up to the 770 (2.13GHz).

Cube Mini is an apt description of the MZ915-M, as it measures just 105mm high and weighs a mere 2.6kg. The flawless gloss black finish looks stunning.

When you first open the MZ915-M's case, which is held in place by three thumbscrews, you'll be amazed at how little space there is inside. But have no fear, Aopen has made the MZ915-M as easy to build as possible with some neat design touches, especially with the drive cages. By following the manual, complete with colour photos and illustrations, you should have no problems during the build.

Thanks to the 915 chipset you get an x16 PCI Express graphics slot as well as a PCI slot. The latter could be used for a TV card if you're building a media centre system. Two DDR2 memory slots are also included, along with integrated 7.1 audio and Gigabit Lan.

Aopen's MZ915-M shows you don't need a full-size desktop or tower system to get all the features you have come to expect from a standard PC. Our only real complaint is that it's very expensive. *Simon Crisp*

Details
Price £243
Best price www.pcw.co.uk/bestprices
Contact PC Nextday
www.pcnextday.co.uk
Specifications Intel Pentium M
(533MHz FSB) • Intel 915 chipset •
1 x16 PCI Express • 1 PCI slot •
Gigabit Lan • 4 USB2 • 1 Firewire
port • S/PDIF and co-axial out •
200 x 320 x 105mm (w x d x h)

Verdict
Pros Good features; very small
Cons Expensive for a case
Features ★★★★★
Performance ★★★★☆
Value for money ★★★☆☆
Overall Expensive, but the perfect basis for a small and quiet PC
★★★★☆

BAREBONES SYSTEM
Foxconn Tuckaway
Get more for your money with this mini-ATX case

The aptly named Tuckaway from Foxconn is a small form factor barebones system based on Intel's Socket 775 motherboard with the 915GL Express chipset.

One of the reasons the Tuckaway is so compact is that it has an external power supply. With the lack of an internal PSU and the passive CPU cooler, you get a near-silent PC. Foxconn says the motherboard will support 800/533MHz Celeron D processors up to 3.06GHz and Pentium 4 models up to 3.2GHz, but we'd recommend you stick to slightly slower CPUs to help keep the internals cool.

The sturdy aluminium case lifts off and, just like the case of the Aopen MZ915-M (see review above), the

internals are crammed together. Installing all the bits and pieces can get fiddly, as it's such a tight fit.

The 915GL Express chipset supports up to 2GB of DDR Ram via two slots, while also providing integrated Gigabit Lan, 5.1 audio and Intel's integrated GMA 900 graphics. There is a x16 PCI Express slot, while a standard PCI slot is available should you wish to add a TV tuner card.

It is important to be careful when choosing which hard drive to use with the Tuckaway. The drive cage is a bit shallow, so drives with many platters (internal disks) simply won't fit. However, on the plus side, Foxconn provides the Tuckaway with a slimline DVD combo drive and a multiformat memory card reader. All major cards are supported bar the XD Picture Card. Two Firewire and six USB sockets are available, a selection of which are conveniently placed on the front of the case alongside microphone and headphone sockets.

The Tuckaway is expensive, but it is very well made and one of the better-looking mini-ATX cases we've seen. It might not be as small as Aopen's MZ915-M, and doesn't support Intel's range of Pentium M processors, but you do get more features for your money. *Simon Crisp*

Details
Price £233
Best price www.pcw.co.uk/bestprices
Contact Xenex 0870 777 3640
www.xenex.co.uk
Specifications Socket 775
processors • Intel 915GL Express
chipset • 1 PCI Express • 1 PCI slot
• DVD combo drive • Card reader
• 6 USB2 • 2 Firewire • 324 x 300 x
66mm (w x d x h)

Verdict
Pros Passive CPU cooling;
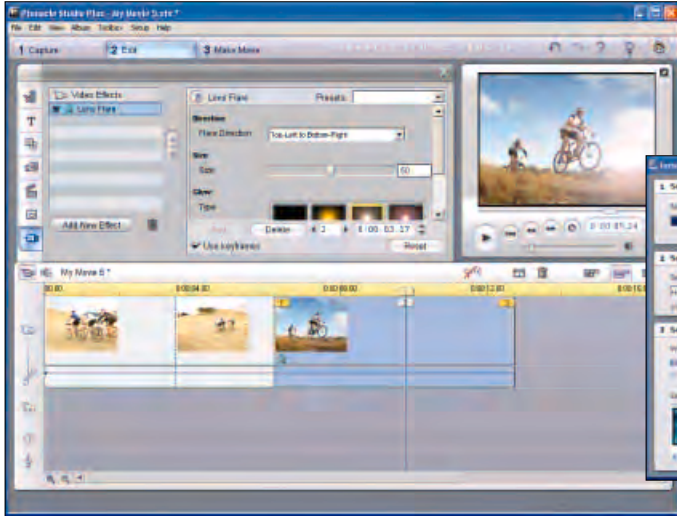external PSU
Cons Expensive; no support for
Pentium M
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆
Overall Thanks to the external PSU and passive CPU cooling, this well-designed case is whisper quiet
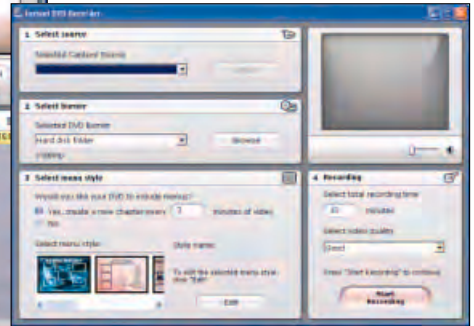★★★★☆

VIDEO EDITING
Pinnacle Studio Plus 10

A new engine and extra features help produce quality projects on a budget

Personal Computer World
RECOMMENDED

Left: The easy-to-use interface has been left largely unchanged

Below: Studio 10 can capture video from a range of sources

We've seen Pinnacle's popular video-editing program, Studio, return year after year with minor tweaks and additions. This time, however, there's something different going on.

Pinnacle was acquired by Avid in 2005 but, aside from a little rebranding, the new parent company's influence on this entry-level product has so far been minor. Instead, many of the changes in the new-look Studio come courtesy of a previous acquisition – the German video-editing software company Fast, whose Liquid Edition now provides the engine that runs Pinnacle's program.

Essentially this is good news for Studio users. Liquid Edition's technology is, says Pinnacle, more powerful. More importantly, it's also more stable than Pinnacle's own notoriously flakey Studio code. Stability is, of course, difficult to measure. The program certainly didn't fall over while we were testing it, but only time will tell whether Pinnacle's claims are well-founded.

Studio is now available in a range of different permutations. At £50, plain old Studio is the entry-level, budget version, with cut-down features and simplified workflow. Pinnacle Studio Plus is aimed at slightly more adventurous users. For an extra £20 it gives you a number of additional filters, effects and transitions, as well as two layers of video in the timeline and compatibility with a range of high-definition video formats. HD (High Definition) compatibility is definitely a plus point but is unlikely to sway anyone other than semi-pros at the moment. It's good to have HD on board nonetheless, especially when it has been integrated so seamlessly.

Both Studio and Studio Plus can be purchased as software-only products or in tandem with either an internal or external capture device. The external solution is of particular note since it features a bidirectional Firewire to USB2 converter. Given that all PCs have USB and all camcorders have Firewire, but not necessarily the other way round, this innovation falls into the 'why hasn't anyone thought of this before?' category.

We tested the software-only version of Studio Plus, which provides just about everything that any desktop video editor would ever need, from capturing to editing, right through to outputting your finished work. The program's interface has been left largely unchanged since version 9, aside from a slight scrub-up. Generally speaking this is a good thing, since the trio of timeline, preview window and context-sensitive, tabbed album window is a winning combination. Even the most inexperienced will find it hard to go wrong here. Pinnacle also provides wizards for many tasks and includes its own take on the now obligatory one-click automated movie-editing option, called Smartmovie.

The most welcome improvements in Studio 10 are often the most subtle. Audio scrubbing in the timeline, for instance, is very useful, as is the ability to maintain the audio pitch whenever you slow down or speed up a clip. Even better is the fact that most effects can now be implemented using keyframes, which allows for much tighter control. Perhaps the best improvement, however, is the way in which it provides realtime, full-resolution previews by leveraging the graphics card's GPU and memory, rather than the main system CPU – another relatively simple innovation that could make an enormous difference to a lot of users.

If you're after a video editor that's easy to use yet feature-rich, Pinnacle Studio 10 is definitely a package worth considering. *Jonathan Parkyn*

Details

Price £69.99
Best price www.pcw.co.uk/bestprices
Contact Pinnacle 01753 655 999
www.pinnaclesys.com
System requirements Windows XP • 1.4GHz processor • 512MB of Ram • 1GB hard disk space (3GB for bonus materials)

Verdict

Pros Easy to use; HD compatible
Cons Only two tracks of video in the timeline
Features ★★★★☆
Ease of use ★★★★☆
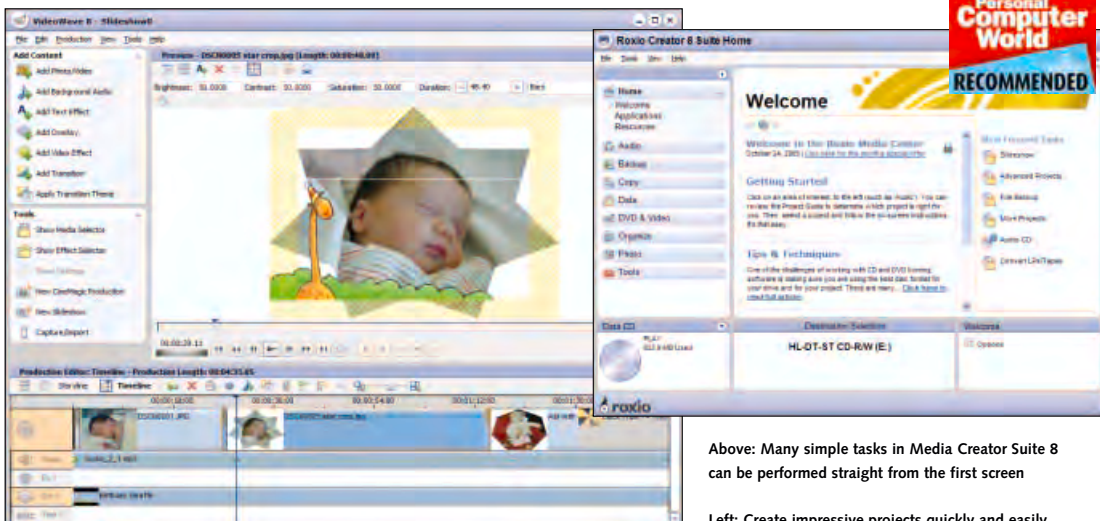**Value for money** ★★★★☆
Overall Small but significant improvements make this the best version of Studio yet
★★★★☆

EDITING PACKAGE
Roxio Easy Media Creator Suite 8

Store, manipulate and get creative with your images, video, music and more

Above: Many simple tasks in Media Creator Suite 8 can be performed straight from the first screen

Left: Create impressive projects quickly and easily

Roxio Easy Media Creator Suite 8 is an ambitious piece of software as it attempts to be your resource for all kinds of digital media projects, including photos and videos, as well as more serious tasks such as backups. Not only does it achieve this goal, but it is all the more remarkable for being easy to use without leaving more advanced users frustrated.

The Home application is the centre of Creator and the starting place for nearly every part of the suite. Redesigned from the previous version to be more logical, some simple tasks can be performed straight from the Home screen without having to load a separate application – a great time saver.

More wizards have been added to tasks that previously just launched the relevant application. Creating a photo slideshow can now take as little as 15 minutes using the templates for transitions, panning and zooming. It can even analyse the background music and match the transitions to the beat of the track.

The key to Creator's appeal is its ability to produce impressive-looking projects with little user interaction. When the automated process has finished, be it a photo slideshow or video, you're given the option to either edit the project or simply burn it to a CD or DVD.

Organising and sharing digital media stored on your computer is another task handled by Creator 8. The Organise application can be used to arrange media into albums or you can browse by date. Media on the computer can be shared using the UPnP (Universal Plug and Play) standard via the My Mediaspace application. This is useful if you have a UPnP media streaming device on your network that can't read basic folder shares.

Another sharing tool is the private peer-to-peer application called Liveshare, which lets you share photos over the web with friends and family. Although the computer storing the media must be left on so it can be accessed, Liveshare is a good solution to the problem of sending large images via email. Messages with thumbnails are automatically generated and sent to those people you want to see the photos.

If you've got a large amount of music to burn, Creator can help you create a DVD audio disc that can hold up to 50 hours of music. Copying music from LPs or cassettes is made much easier by using Musictags with the Gracenote CD database (www.cddb.com). Rather than relying on track times as with CDs, the software creates a digital fingerprint using the first few seconds of the track to compare with the database. The results were not as reliable as with a CD, but this is still an improvement on entering track names by hand.

As expected, the video-editing application, Videowave, now supports the HD (High Definition) formats as found in some of the latest digital camcorders. It can also handle the popular DivX codec, which is great for reducing file sizes but maintaining quality.

Backup MyPC, introduced in Creator 7.5, has also been given an update. It now features an easy-to-use wizard interface with options such as incremental backups, compression and encryption. It cannot make an image of a hard disk but it can include or exclude files based on type.

We were impressed with the previous version of this package and, with Creator 8, Roxio has made a great product even better. *Tim Smith*

Details

Price £59
Best price www.pcw.co.uk/bestprices
Contact Roxio www.roxio.co.uk
System requirements 1.6GHz P4
• 256MB of Ram • 1GB hard disk
(9GB for DVD Video capture)
• Windows XP

Verdict

Pros Easy to use; range of features
Cons Some components are limited
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★☆
Overall An easy-to-use suite that covers every aspect of digital media and is great for creating impressive projects
★★★★★

EDITING SUITE

Nero 7 Premium

This package ventures beyond disc burning, into digital media and home entertainment
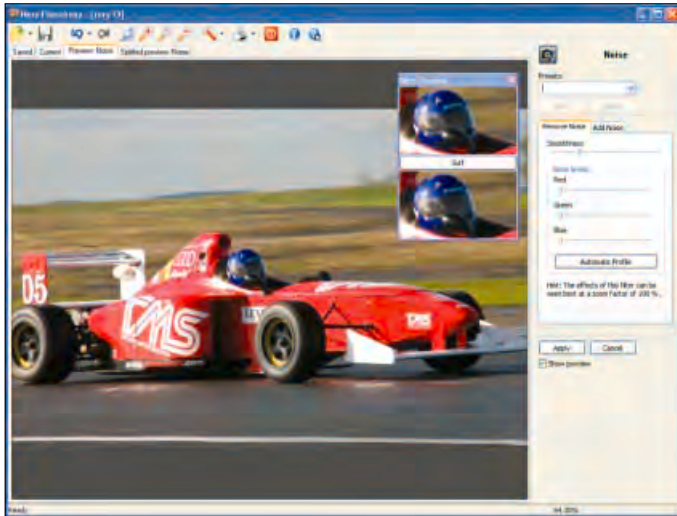
Above: Nero's Startsmart launcher system links the 18 separate applications

Left: Edit images using the Photosnap application

Similar to Roxio Creator 8 (see page 58), Nero 7 Premium is an all-in-one digital media and home-entertainment solution that helps you create, burn, edit, share and organise your movies, music and photos.

The package comprises 18 separate applications linked by Nero's Startsmart launcher system. Startsmart has a task-based interface, so you simply tell it what you're trying to do (burn an audio CD, copy a DVD movie and so on), and Nero chooses the best application for the job. If it all gets too complicated, you can click on the Favourites section of Startsmart where the most common tasks are listed.

At the heart of the program is Nero Burning Rom 7 and the more user-friendly Nero Express 7, both of which let you create audio, data, photo and video discs.

Little has changed in these programs since Nero 6 but there are subtle improvements, such as support for high-capacity Blu-ray and HD-DVD data discs. It also supports HP's Lightscribe technology, which lets you burn labels directly to a disc using compatible drives.

The most significant new addition to Nero 7 Premium is Nero Home – the company's first foray into media playback. This personal video recorder (PVR) application works in a similar manner to Windows XP Media Center Edition, allowing you to listen to music, view images, and (if you have a TV tuner) watch and record live television.

It isn't as accomplished as some rival programs (it lacks electronic programming guide (EPG) support), but it's easy to install and configure and uses a '10ft user interface' so you can control it from a distance using your TV tuner's remote control.

Nero Scout is a complement to Nero Home that works by automatically cataloguing all your media files for easy access. It's a great idea, but the cataloguing process is rather slow.

Nero Vision 4 – another part of the Nero 7 Premium suite – lets you create DVD movies. It isn't as polished as Adobe Premier Elements, for example, but it supports DVD menus and chapters and should be adequate for the average user wanting to create basic DVD movie discs. Naturally, Nero Vision 4 supports mpeg4 video, but we were disappointed at the lack of support for the popular DivX file format.

The other major inclusion in Nero 7 Premium is Nero Backitup 2. This allows users to run scheduled backup operations on your PC, and you can specify which file types to exclude from the backup process.

Online backups are supported via file transport protocol (FTP), and you can save password-protected disc images to internal and external discs.

The Nero 7 Premium package is rounded off with Nero Wave Editor 3 and Nero Soundtrax. Both let you easily create and edit all manner of audio projects including basic mix-CDs and 5.1 or 7.1 audio tracks. Wave Editor also lets you record from various sources on your PC, and can be used to capture streaming audio via the Internet.

Despite its wealth of features, we were frustrated by some of the program's foibles. Its applications don't share a uniform look and feel disjointed, despite being linked by the Smartstart launcher. The program was also rather prone to crashing, although Nero plans to release a patch that will improve its reliability.

Nero 7 Premium is by no means perfect. Some may consider it to be a jack of all trades and master of few, but it has a wealth of useful features and is excellent value for money.   *Rory Reid*

Details

Price £47.38
Best price www.pcw.co.uk/bestprices
Contact Nero www.nero.com
System requirements
800MHz processor • 128MB of Ram • 600MB of hard disk space • CD or DVD writer

Verdict

Pros Variety of applications
Cons Prone to crashing; no DivX support; lacks EPG
Features   ★★★★★
Ease of use   ★★★☆☆
Value for money   ★★★★★

Overall Not quite perfect, but has a fantastic array of applications for handling your media

★★★★☆

PANORAMA CREATION
Realviz Stitcher 5
Producing 360° shots is now quicker than ever

Panorama stitching software can broadly be split into two groups. There are those such as Photomerge that let you stitch together a few images to produce an ultra-wide-angle view, and then you have applications such as Realviz Stitcher. Aimed at professionals and serious panographers, it allows you to produce 3D panoramas that put you at the centre of an immersive 360° virtual world.

The most arduous part of the process is manually overlapping shots so the software can match up corresponding details and fit them together. Stitcher 5's new automatic stitching feature makes this easy. Tell the program which images to use and it takes over. It sounds too good to be true, but within a few minutes Stitcher 5 created a flawless panorama from 32 images, saving about half an hour's work.

If you prefer to put your panoramas together yourself, there's also a new manual method which involves placing control points on corresponding image details. And, of course, there's the semi-automatic method of approximate manual positioning followed by automatic stitching.

The Stencil tool now works in the stitching window, rather than its own dialogue box, but a more significant improvement is the introduction of support for Photoshop layer masks. It's now also much easier to export panoramic files for editing and re-import them prior to rendering a Quicktime Virtual Reality (QTVR) movie or another similar format.

In addition to a new streamlined interface, other enhancements include a new live preview window, the ability to save render presets and support for QTVR scripting. But it's the automatic stitching that will sell this new version to existing users as well as those considering entering the field. *Ken McMahon*

Details
Price €582 (£399 approx)
Best price www.pcw.co.uk/bestprices
Contact Realviz 00 33 4923 8460
www.realviz.com
System requirements P4 1GHz
or higher • 256MB of Ram •
100MB hard disk

Verdict
Pros Automatic stitching; layer mask support
Cons Interface still unwieldy in places; expensive
Features ★★★★★
Ease of use ★★★★☆
Value for money ★★★☆☆
Overall Comparative ease of use and unmatched power, but at a price
★★★★☆

3D GRAPHICS
Xara Xtreme
Powerful editing package for a variety of image types
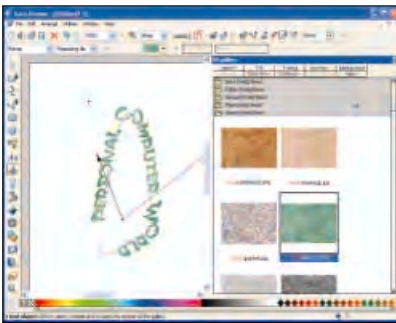
Xara is well known for its graphics programs, including tools such as Xara 3D that lets amateur web designers create buttons and logos with ease. Xara Xtreme is a vector and bitmap graphics package. Users familiar with Xara's X1 vector package will feel quite at home, though those who have used other tools might find that the Xara interface takes a little getting used to. For example, to add a drop shadow you don't pick the angle of illumination as in other programs; you just click the drop shadow button and drag the shadow where you want it. Other tools work in a similar way. It's very easy, once you've worked out how they behave, but we did have to resort to the manual a few times and we'd still prefer flyout options for fills, for instance, instead of a button on the left, along with options at the top of the screen.

The package is speedy and it's very easy to perform tasks such as wrap text along a line or merge objects in multiple steps. New features include the ability to export as pdfs, alongside a wide range of other formats, and a Photo Editor that can be used standalone or from within Xtreme. Red-eye removal is also available and there's support for Photoshop plug-ins.

There's a wide range of galleries, with textures and fills downloadable over the Internet, which saves cluttering the disk with objects you might never use, and a good range of tutorial movies too. Adding simple regular shapes such as polygons or stars is extremely simple.

With the built-in photo editor, enough creative power even for advanced users and a very attractive price, Xara Xtreme provides just about everything you'll need for creating and editing graphics, whether bitmap or vector. *Nigel Whitfield*

Details
Price €79 (£54 approx)
Best price www.pcw.co.uk/bestprices
Contact Xara www.xara.com
System requirements Pentium
processor • 128MB of Ram •
Windows 98 or later

Verdict
Pros Easy to use; pdf export facility
Cons Interface can take some getting used to
Features ★★★★☆
Ease of use ★★★☆☆
Value for money ★★★★★
Overall A powerful graphics and photo-editing tool that's easy to get to grips with and flexible enough for simple web graphics or more detailed designs
★★★★☆

SIMULATION
Black & White 2

Gain the trust and respect of your minions; then slap them about

Above: Over the course of the game, your creature develops a unique personality and appearance

Left: You can pick up and manipulate objects

The original Black & White gained huge attention as one of the best 'god' games of 2004, so it was with great enthusiasm that we received its successor, Black & White 2. The game follows the same basic formula as the original players assume the role of a deity who must create a world and win the hearts and minds of its inhabitants.

The original Black & White was very open-ended, a trait that was loved and hated in equal measure by its audience. This outing, for better or worse, is far more structured.

Players start the game by taking control of the Greeks in a world that is also inhabited by the Norsemen, the Japanese and the Aztecs – each of which have rival gods. During the early action, the Aztecs destroy the Greek capital, but not before you manage to teleport a handful of survivors to a safe haven to start a new civilisation.

As their god, you'll need to pander to their needs, construct complex cities and amass an army to fend off potential invaders and raid foreign lands.

Gaining the support of your followers can be done in two ways. You can either adopt a good personality, treating them well, or you can start a reign of terror – literally tossing innocent bystanders onto sacrificial fires.

At every step of the way you'll get the help and advice of comedy duo, an angel and a devil, who provide tips on how to deal with particular situations.

The key to success in Black & White 2 is building a thriving city. The mechanics of this are fairly simple. You can assign villagers to certain roles (farming, forestry, breeding and worshipping) and just let them get on with things.

If your city is lacking in a particular area they'll let you know and you can take appropriate action.

Ultimately you'll need to acquire a large enough army to fend off attacks from rival gods. This can be done by building an attractive city that villagers from other lands will want to join, or you can conquer those lands using force.

The former option can become very tedious. Each new section of the game involves creating new cities, and you can often feel like more of a local mayor than an all-conquering deity.

The combat elements of the game are far more enjoyable. You can use your godly abilities to hurl fireballs at the enemy, or use your creature – an animal avatar – to inflict huge damage.

This creature (you can choose between a cow, lion, ape or wolf) acts much like a pet. You can discipline it by petting it or by slapping it, and over time it forms a unique personality and physical appearance. If you treat it well it'll look friendly, but if you abuse it, it'll look mean and act accordingly.

Unlike the original game, Black & White 2 lets you see exactly what your creature is thinking. This means you can intervene before it picks up bad habits (such as killing your citizens), but it diminishes the enjoyment of watching it learn and grow on its own.

Despite some flaws, Black & White 2 is better than its predecessor. We would like to have seen a few more features that help promote a feeling of power, and a little less repetition in the city-building process, but these are minor gripes. Though this shares a lot of traits with other 'god' games, it incorporates several unique elements that should appeal to most gamers.

Rory Reid

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact Electronic Arts
www.eagames.co.uk
System requirements 1.6GHz processor • 512MB of Ram • Windows 98SE/2000/ME/XP • 64MB video card with 1.1 pixel shader

Verdict

Overall An unconventional but extremely enjoyable simulation game

★★★★☆

SPORT SIMULATION
Football Manager 2006
Tinker with tactics and bawl out your players

Including over 275,000 players and staff, and 5,000 playable teams from 50 countries, Football Manager 2006 has arrived.

As expected, the interface has been given an overhaul. Newcomers will find the huge array of options overwhelming, but the beauty of Football Manager is that you don't have to put all the in-depth strategy tools to use from the start. As you progress, you'll soon want to start tinkering with tactics and being more selective over your backroom staff. Sports Interactive, the game's developer, has also taken time to make the database more efficient.

Starting a new game in Football Manager 2005 could take anything up to 15 minutes, but now it takes no more than a couple of minutes.

In-game processing has also been given a shot in the arm. A new range of features improves an already impressive simulator. Should your team be underperforming, you can administer a scathing team talk during the half-time interval. If one player is putting in a particularly shocking display, it's possible to single him out as the scapegoat. How each player reacts to your comments will vary – some will decide to earn their corn, others will be in touch with their agents.

Other improvements include the option of bar charts instead of numbers for players' stats and the ability to counsel unhappy team members. You can also negotiate your salary and wage budgets with the board.

There are a few irritations. Contract negotiations could be more realistic and you're stuck with a restrictive set of reasons when you want to discipline a player, but there's little else to criticise. Having been around for years in the form of Championship Manager (Eidos now owns the rights), it's the most comprehensive football management simulation money can buy. *Will Stapley*

Details
Price £34.99
Best price www.pcw.co.uk/bestprices
Contact Sports Interactive
www.sigames.com
System requirements 2GHz processor • 256MB Ram • 8x CD-Rom • Windows XP SP2

Verdict
Overall Building on the success of previous versions, Football Manager 2006 is the ultimate management simulator
★★★★★

SIMULATION
NBA Live 06
Slam one in with extra superstar panache

Many sports fans will agree that sport is made more appealing because of the key players taking part. In football, players such as David Beckham draw huge crowds, while basketball stars such as Shaquille O'Neal and Kobe Bryant help create that extra spark of excitement in the NBA.

NBA Live 06 – the latest iteration of the popular basketball series – tries to highlight the skills of key players by incorporating a 'Superstar abilities' feature. This lets star players (those with the best reputations in the NBA) unleash a range of super-moves that help distinguish them from their counterparts.

Star players can be classified as high flyers, scorers, playmakers, power players, sharpshooters and stoppers. A single player can have multiple abilities and you can even change the default superstar ability of a player should you see fit.

The most fun can be had when linking these abilities together in a combination. You can still use the freestyle dribble moves from the previous game but, when attacking, you can now use a playmaker's behind-the-back pass to bamboozle your opposition, then use a scorer to cut your way through a forest of defenders for a lay-up, or deliver a ferocious tomahawk slam dunk with a high flyer.

Using these special moves adds a great deal of excitement to the gameplay, but it makes the game feel like the arcade-oriented NBA Street. Also, there are quite a few players who aren't equipped with superstar moves, so if you choose a team without a flashy front-man you'll have less chance to use flamboyant plays.

NBA Live 06 is a very good game. It isn't leaps and bounds ahead of its predecessors, but it is a welcome addition to the series and a great excuse to get into basketball games. *Rory Reid*

Details
Price £29.99
Best price www.pcw.co.uk/bestprices
Contact Electronic Arts
www.eagames.co.uk
System requirements 1GHz processor • 256MB of Ram • Windows 98SE/2000/ME/XP • 32MB video card

Verdict
Overall NBA Live 06 has an arcade feel, but is still great fun to play
★★★★☆

Show me the way to go home

Satellite navigation is vital if you travel a lot for work or pleasure and if you own a PDA or smartphone it can be cheap to add GPS software. Nigel Whitfield tests eight packages

'There's a wide range of solutions, so most users just need to pick the best option for the device they want to turn into a navigation tool'

Over the past few years, the cost of global positioning systems (GPS) has fallen dramatically. They're no longer the preserve of hikers or sailors or restricted to dedicated units with poor interfaces. As the phones and pocket computers we carry around have become more powerful and flexible, it has become easier than ever to add GPS-based route planning to a device you'll probably have in your pocket anyway. Typically you just need to install the mapping software and a GPS receiver which, thanks to Bluetooth, no longer has to be a dedicated model that works only a limited number of PDAs, helping to reduce costs even further.

Whether you're using a Palm OS PDA, a PocketPC, Windows-powered smartphone or a Symbian device, there's a range of solutions that you can buy, so most users just need to pick the best option for the device they want to turn into a powerful navigation tool. We've put eight different systems to the test, covering a range of platforms, to find out how well they all stack up. When you consider that most use the same base mapping information from a choice of only two companies (see 'Information from the sky' box on page 72) you might think there's not much to choose between them. But there are bigger differences than you might expect – and some pitfalls to beware of, too.

If you don't have a device that will run navigation software, but you're nearing the end of your mobile phone contract, you should find this test useful too – just pick the system you want and upgrade to a smartphone model.
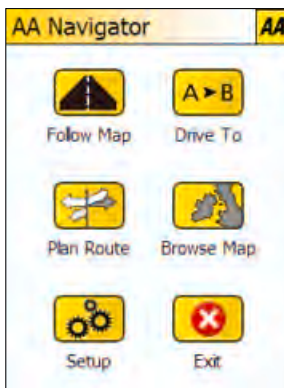
AA Navigator

Price £99 **Contact** www.theaa.com

The AA interface is simple and uncluttered

The AA has been providing route guidance to motorists for many years, so it's no surprise that it should produce a branded piece of software for Pocket PCs.

The system installs from a memory card, though you need to be connected to your computer to activate the software via the Internet, so don't make an impulse purchase if you're stuck without web access.

Mapping includes details of tolls and congestion charges, with a clear warning and an offer to recalculate your route to avoid them if necessary. Thankfully, the screen is uncluttered and the buttons big enough that you can do everything you need to without resort to a stylus, including dragging the map and tapping to select start and end points.

So far, so good. But there are annoying quirks; you can find a street using the on-screen keyboard and choose to view it on the map – but it's not highlighted, and won't even necessarily have the name visible until you drag or zoom a little.

And whoever created the favourites menu needs a talking to; tap the name and you see it on the map. Tap the little pen icon and you can change the name, or assign one (when you create one, it just has the street name). But to remove one, tap the Change button at bottom of the screen, then the Remove button on the next screen and then on the next screen the one that you want to remove. It may help keep the number of buttons per screen down, but it's quirkier than necessary.

Niggles aside, this is a reasonable system, with good directions and a lot crammed onto the 128MB card. Also sold as a complete pack with cradle and Bluetooth GPS, it's a straightforward solution for UK drivers.

Verdict

Pros Easy to use without a stylus
Cons Some interface annoyances
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall Reasonable performance and a tolerable interface make this a handy package for Pocket PC users
★★★★★
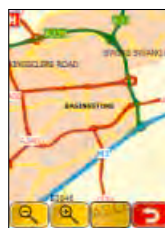
You can plan a route and find locations on the map without resorting to the stylus

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ALK Copilot Live 6

Price £134.99 **Contact** www.alk.com
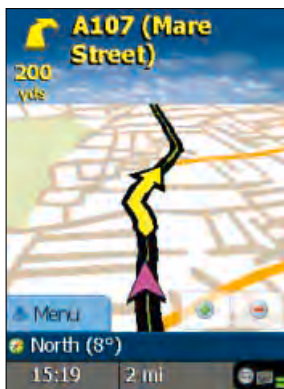
Copilot 6 has traditional 3D views, as well as the 'safe' display mode, which we found annoying

ALK's Copilot Live is available for a range of Windows Mobile platforms; we tested it on a T-Mobile MDA, where the GPRS connectivity can be used to access live traffic information or to send details of a new destination to another Copilot user.

Installation from the 1GB memory card is simple, with Internet-based activation, which allows you to select one of the map regions. A text-to-speech engine is also installed, allowing the program to speak street names, making a reasonable effort at doing so. The interface has been improved over version 5, with a larger on-screen keyboard – though on a device like the MDA, it's still a little on the small side for entering addresses without a stylus. There's now a menu button displayed on-screen that you can use to select a different map view; a full-screen 'safe driving' display gives you information about the next turn, with the map appearing only when you're going slowly. We find this a little annoying though, as we couldn't see through some one-way road systems.

We also felt the system was a little slow at updating, giving instructions a bit too late at complicated junctions – and in one case thinking we were on a minor road 100m to one side of the dual carriageway we were actually driving on.

There are some interface niggles too; you can set the system to announce points of interest – handy for 'can you drop me off at a station' type situations. A quick tap will add these to the current route. But if Copilot is in the middle of announcing instructions for the next junction and a point of interest comes in range, it'll announce that instead, chopping off the end of the instructions. Though you can change some options while driving, we couldn't find a way to stop it from happening. We also managed to cancel our route once, when switching from planning to guidance mode.

Verdict

Pros Simple to install; compact solution; traffic info via GPRS
Cons Very quiet; instructions sometimes come too late
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall Although it's a good improvement, late instructions and some interface annoyances mar this product
★★★★★

Although better than the old version, we still felt the interface was awkward in some places

Destinator PN

Price £99.99 **Contact** www.destinatoreurope.com
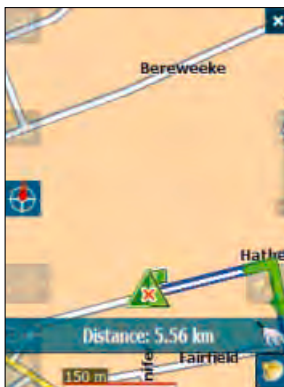
With meaningless icons that fade out around the edge of the screen, Destinator's interface isn't very intuitive

Destinator PN is a software-only Pocket PC solution that provides maps for the whole of Europe. It's available as a pre-installed SD (Secure Digital) card or with maps on CD, which is rather more involved – you need to activate the application online, install it (and the optional Text to Speech utility for spoken street names), along with the maps. The UK and Ireland takes up 128MB, with 130MB for major European roads; a 512MB card

should be enough for the UK plus the major EU roads and full details of your final destination country.

While that's a good start, things go downhill from there, with an interface that ranks as one of the worst we've seen on a GPS. Picking a destination involves scrolling through a screen – which didn't even render neatly on our Ipaq – to pick city, street and then house number, using a small on-screen mobile phone-type keypad, resulting in lots of pokes on the same button to get the right letter. Tap City; fiddle 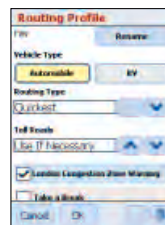around; tap street, fiddle a bit more, tap a number, tap the small Navigate button at the bottom of the screen. You can't even point to somewhere on the map and select that. And if you're planning a route from A to B, would you really think of tapping 'Destination,' selecting a place, then tapping the small Tools menu and choosing 'Set as origin'?

The driving display is adequate, but with an array of confusing icons – best to take the cribsheet with you, since they're far from intuitive, not to mention small and fiddly to use. We found ourselves grabbing the PDA from the cradle to do things – hardly safe usage.

The voice instructions were perfectly audible, and the maps up to date – though sometimes spoken commands were a little premature – without a glance at the screen, we'd have taken a wrong turning. Ultimately though, good maps are little use when trapped behind an interface this awful.

Verdict

Pros Good geographic coverage; TMC traffic information support
Cons Interface; premature directions
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall This package may come with plenty of maps on CD and support for TMC, but it had a cluttered, hideous interface that will drive you mad
★★★★★

Selecting a destination is frustrating, and too fiddly

Navicore Personal

Price £129.95 **Contact** www.navicoretech.com

Personal Computer World EDITOR'S CHOICE

You can't see much of the map, but we still found this an easy system to use

Navicore Personal is designed to run on Symbian phones; we tested it on a Nokia 6630. Installation is simple, using a memory card, and the package includes PC software and a card reader, so you can choose which maps you would like to installl. With a supplied 256MB card, the UK takes up just under half of this – but with France coming in at 230MB, you'd need at 512MB card to get you to Amsterdam, for instance.

After using so many devices that allowed us to tap on the screen to find parts of the map, we were surprised at how easy it was to use the Series 60 version of Navicore, which doesn't have a touchscreen. The phone's four-way navigator button allows you to scroll; press and it switches to zooming in or out. Entering addresses is easy using the phone keypad as matches are listed in distance order, which turned out to be helpful.

Directions seemed clear and accurate, though there was a tendency to favour faster roads; voice instructions were loud and concise and can – with updated phone firmware – come through your Bluetooth hands-free kit. Other features include location-based messaging, so you can update other users with your current position or send them details of where you're going.

We were also pleasantly surprised by how easy the map was to use, despite the small size of the screen on the phone we used; the CD contains optimised versions of the application for a wide range of Symbian phones, to ensure it gets the best out of each.

All in all, Navicore was one of the simplest solutions to use, and a good all-round performer. That it works with some of the most popular smartphones on the market makes it an even more attractive option. Even if you don't have a Symbian phone, we think it's worth considering an upgrade – your phone network will be effectively subsidising your GPS hardware.

Verdict

Pros European mapping; good instructions; simple to use
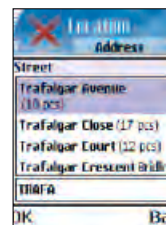**Cons** Supplied memory card only 256MB
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall An easy-to-use solution that should be on every Symbian user's shortlist
★★★★★

Finding locations is surprisingly easy, considering the small screen on a Series 60 phone

Navigon Mobile Navigator 5

Price £89.99 **Contact** www.navigon.com

Tap on the logbook, and you can make GPS-related entries as you travel

Navigon's software for Pocket PC is one of the few around that's TMC enabled. That, for the uninitiated, means it can pick up travel information broadcast using the Traffic Message Channel, which uses FM technology based on the familiar RDS (Radio Data System) used in car radios. It's a neat idea and avoids the need to use GPRS to download updates, but it does mean that to get the best out of the system, you'll need a TMC receiver too, which can add about another £60 to the cost.

The software has a slick look to the interface and it's possible to enter addresses fairly easily without resorting to the stylus; the navigation display is clear, showing time remaining and a small diagram of the next turn, and the spoken commands are pretty audible, even without an amplifying cradle.

We did find some of the menus a little curious in their operation but you do get used to it and can do it all with a finger, although it does have an unusual carousel-type system for picking options. On a more positive note, for those with big fingers, you can call up an on-screen mobile phone-style keypad as well as a full alphanumeric one.

A useful feature for business users is a logbook system, where you can make an entry for a specific location – this is marred, however, by not working when the GPS connection is inactive, so you need to remember to make entries before getting out of the car.

Though route planning and redirection was quick with reasonable instructions, we weren't always told which lane to take – a bit of a problem when there are five at a junction, with four different routes. Even 'bear left' would have been helpful to reduce the need for us to look at the screen.

Verdict

Pros TMC support; GPS logbook
Cons Not enough instructions for lane changes

Features	★★★★☆
Ease of use	★★★☆☆
Value for money	★★★☆☆

Overall Useful features such as TMC support and a logbook make this an option that business users may find particularly attractive

★★★☆☆
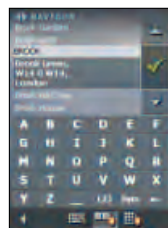
The carousel arrangement of menus is a little odd, but you soon get used to it

Route 66 Mobile Britain 2006

Price UK: €149 (£101 approx); Europe: €249 (£169 approx) **Contact** www.66.com

Personal Computer World
RECOMMENDED

With a clear display, our main complaint was the quiet navigation directions

Route 66 Mobile Britain 2006 is designed for Symbian UIQ-based smartphones; the small print in our review sample revealed it's just for the Sony Ericsson P910 and P910i, although other versions of the software are available for Nokia phones and older SE models. The software runs from a 256MB Memory Stick Duo, so installation is straightforward.

We found using the system quite simple – a tap on the map screen takes you to a page of menu options with reasonably sized buttons – but when you want to enter an address, the on-screen keyboard is a little small. The sub-screens on some menus need the stylus or a fingernail, too. Another minor niggle is that after changing an option, you go straight back to the map, so you have to tap it again to change another one. Useful options include routes for lorries and pedestrians, as well as cars – so this can be a handy tool when exploring a strange city on foot.

The navigation information is fairly clear, even though the speech was on the quiet side and not routed to our Bluetooth hands-free kit. We were told 'follow the road' in a gyratory system, when we needed to take the left exit, however – a case where a glance at the on-screen map helps resolve problems quickly. Occasionally the system seemed a little sluggish at updating, but not unduly so and not enough to cause us confusion.

A very useful option is the live traffic information, fetched via GPRS at configurable intervals. You can view the traffic reports and the system can also use them to route you round congestion – a very neat trick. You can also find nearby points of interest and place calls to them, as well as just planning a route.

A separate European version of the product offers mapping and traffic information in more countries – but beware the roaming charges, as the GPRS traffic information could become expensive if you use it abroad.

Verdict

Pros Live traffic information; simple install
Cons Quiet commands; some menu niggles

Features	★★★★☆
Ease of use	★★★☆☆
Value for money	★★★☆☆

Overall A neat Symbian solution, enhanced by live traffic updates via the Internet

★★★☆☆
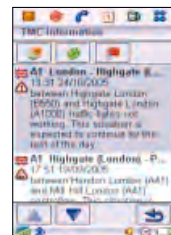
Route 66 will download and make use of traffic information, via your GPRS link

Tomtom Navigator 5

Price European mapping: €199 (£135 approx) (Windows and Palm) **Contact** www.tomtom.com

With Tomtom's simple interface, you can be up and running easily – shame about the maps

Tomtom is probably one of the best-known names in navigation and its package comes on a memory card that can be installed in either Windows Pocket PC or Palm OS systems, with simple activation required via the Internet.

We looked at a pack that comes with Tomtom's own Bluetooth GPS receiver, which was a doddle to set up; trying to make it work with other receiver models, however, was harder work.

As with previous versions of Navigator, on-screen buttons are large and simple to use – though it does mean you have to go through a few screens to reach some options. Spoken directions (there's a choice of male and female voices) are clear and stop when it's obvious you've gone past the 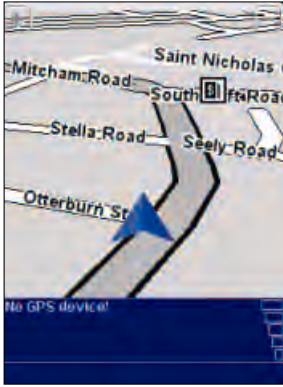turning, minimising the nag factor. If you do go wrong, the system seems to prefer you to pull into a side road to turn, rather than telling you to make a U-turn where you are, which is much more sensible.

Tomtom Plus, an Internet-based service, allows you to download additional voices and can give extra information such as traffic reports, to enable re-routing or even the weather at your destination. Sadly, after a free month, it's chargeable, unlike the options provided by some of the competition.

Unfortunately, we felt let down using the software. We could find our home address by postcode, but picking Hackney as the town didn't turn it up for a search by street name. When we went out on the road, it was apparent that the maps weren't as up-to-date as the other products on test – roads that have been open for three or four years were missing, while some one-way systems and other restrictions weren't included, leading to wrong or illegal directions. When you find so many errors so close to home, it dents your confidence in using the product further afield.

Verdict

Pros Simple to use; clear display
Cons Live traffic information is chargeable; dated maps
Features ★★★☆☆
Ease of use ★★★☆☆
Value for money ★★☆☆☆

Overall A poor performance from a market leader – good software let down by mapping that isn't as accurate as it should be
★★☆☆☆
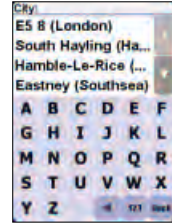
Selecting addresses doesn't mean resorting to the stylus

Viamichelin Navigation 3

Price £87.99 UK; £149.99 Europe **Contact** www.viamichelin.com

Viamichelin's software has few buttons on each screen, making finger control easy

Viamichelin's latest software, which we tested in the plug-and-drive solution, installed via an SD card with UK Maps, is also available in a CD version with maps for more European countries. Though slightly quirky, the PC software does let you select just the bits of maps you want to transfer to your memory card.

We've looked before at earlier versions, and the PDA interface is much improved in this one, with simpler screens that have fewer buttons, making it easier to use with your finger rather than a stylus.

It's very configurable, allowing you to choose which items, such as ETA, distance to go and so forth, are displayed on screen, and to pick your own typical speeds for different types of road. There's a good range of points of interest too.

In use on the roads, voice commands were fairly clear and the supplied Kirrio GPS cradle picked up the signal quickly and meant no fiddling with Bluetooth, though you can use other GPS receivers if you like.

However, a couple of times we ran into problems; the instruction 'Turn slightly left' on a four-lane dual carriageway saw us onto a slip road leaving at the wrong exit. A similar lack of clarity routed us past a roundabout instead of round it – compounded by a very long time taken to recalculate a route as we doubled back, only just telling us what to do as we came back to the roundabout from the other direction.

If we'd not had to stop at the lights, we'd have been driving in circles waiting for instructions, only half a mile from the destination. Our annoyance was compounded as, when we put the PDA back into the cradle to drive home, we accidentally ejected the memory card. Even after re-insertion, the software insisted there were no maps available, a situation cured only by a hard reset and re-install.

Verdict

Pros Very configurable display
Cons Lack of clarity in spoken directions
Features ★★★☆☆
Ease of use ★★☆☆☆
Value for money ★★☆☆☆

Overall A reasonable system, with a much improved interface, but we have some niggles about robustness and clarity of directions
★★☆☆☆

Planning directly from the map is simple and straightforward

Completing the GPS jigsaw

With an amplifying PDA mount you don't need to worry about the volume of the spoken directions

Besides your PDA/smartphone and GPS mapping software, there are a few other things you'll need to make a complete solution. The most obvious is the GPS receiver; most of the packages we tested are available as a bundle that includes a receiver – very often one that connects via Bluetooth. That means one less wire trailing across your dashboard – though you may need to plug it into the cigarette lighter to charge. An alternative is a wired GPS or a cradle that incorporates a GPS receiver – Kirrio's Ipaq cradle (www.kirrio.com), for example, grips the Ipaq, prevents accidental pressing of the buttons and connects GPS via the dock socket on the bottom of the PDA.

You may also need an additional GPS antenna; while most units sit on the dashboard and can receive a good signal there, some anti-reflective coatings on windows can interfere with the signal, necessitating the use of a cabled antenna, which will often stick magnetically to the car roof. These cost from around £30.

A cradle is an essential extra, allowing you to position your smartphone or PDA somewhere you can glance at it – there are cradles for bikes and boats as well as cars. With the battery life on most PDAs not up to a long drive with the display backlight on all the time, a cradle really needs to provide power too, to stop your navigation system going flat on long journeys. Arkon's range of cradles (www.arkon.com) includes versions that just provide power, as well as some with built-in GPS or audio amplifiers.

That last feature is important as well – PDAs and some smartphones simply don't have speakers loud enough to penetrate the noise inside a car – we could barely hear some of them, even in slow traffic. A cradle with an amplifier solves that problem for a PDA but, before buying, find out how long your Bluetooth receiver will go without a charge. If you have to plug it in at the same time as a cradle for the PDA or phone, your car could end up with far too many trailing wires. A secondary DC or USB output on some cradles allows you to power another device that way.

An alternative solution is a fixed GPS unit built into your car. A bit far fetched, you might think? Not so – Parrot's Bluetooth hands-free car kits are some of the best around and the CK3300 provides not only full hands-free functions for your mobile phone, but also a Bluetooth GPS receiver which you can link to a PDA or smartphone for navigation, making a neat, cordless solution.

There is, however, a minor annoyance, and it's something worth checking before you spend money on a Bluetooth smartphone. While both the T-Mobile MDA and Sony Ericsson P910i, for example, can connect to two Bluetooth devices at the same time, allowing them to talk to both hands-free and GPS receivers, the speech from the navigation software only comes through the device's own speaker. You'll therefore still need a cradle with an amplifier or good hearing – especially if you have the radio on too. And that means more cables and fiddling.

The Nokia 6630 we used with the Navicore package, by contrast, does send the navigation instructions via the link to the hands-free – which means, in the case of a car kit like the Parrot models – that your radio or CD is automatically muted when instructions are given. So far, so good, but

A CF Bluetooth adapter such as the Sitecom CN-501 can let you add a low-cost GPS receiver to your older PDA

without a firmware update, the 6630 only manages one Bluetooth connection at a time, so it can't be linked to a GPS receiver and a car kit simultaneously. If you want a completely cordless solution, it's worth making sure your smartphone has up-to-date firmware, so that it can handle simultaneous connections – don't forget that hands-free phoning is now a legal requirement.

Ultimately, of course, the choice of accessories depends on what you already have and whether or not any accessories come with the GPS software you buy. If you're starting from scratch, we'd recommend taking a look at the Parrot CK3300 car kit, paired with a basic cradle. With the right software, such as Navicore and a compatible phone, you'll have a well-integrated system that lets you simply start the car and drive.

Finally, don't worry if you have an older PDA without Bluetooth: a Compact Flash (CF) Bluetooth adapter will only cost you around £30. SDIO versions are much more expensive, however. Ebay is a good place to look for low-cost adapters for your PDA.

Parrot's CK3300 car kit provides Bluetooth hands-free phone and GPS functionality in one unit

Information from the sky

Navstar GPS Joint Program Office

There are currently 29 working Navstar satellites in the GPS constellation. This is one of the earlier Block II/A models

GPS technology to most people is something not far removed from magic, and the misconceptions they have can lead to unreasonable expectations about its capabilities. This isn't helped by the incredible boom in sales of GPS devices to the general public via high-street stores, with staff poorly equipped to explain the ins and outs of what is in reality a highly sophisticated military tool, dumbed down a bit for the masses.

Satellite constellation
The basics of how GPS works aren't that complicated if you understand simple trigonometry, although the technical details of how it's all accomplished in silicon and software would make your eyes water.

The key to the whole system is the 'constellation' of 29 Navstar GPS satellites (each weighing about two tonnes and with a lifespan of around 7.5 years) orbiting the earth at a height of 26.5km. Each satellite constantly transmits its location information (relative to the centre of the Earth) via a UHF radio signal (the frequency is 1,575.42MHz) where it's picked up by your GPS receiver.

Two radio channels are actually used, the second one (1,227.6MHz) carrying the more precise encrypted location information ('P-code') used by the miltary – the less precise civilian signal is known as C/A (Coarse/Acquisition).

Atomic clocks on board the satellites send a constant stream of pulses via the radio signal, each containing information about the precise time any particular pulse left the satellite. By comparing this with the time of arrival at your GPS receiver, and knowing the speed of the radio waves (186,000miles/sec), the distance (known as a pseudo-range) to the satellite can be calculated. By repeating this process with

three different satellites, a 2D position fix (latitude and longitude) can be calculated using a trigonometric procedure known as triangulation. To work out your altitude information as well (a 3D fix) needs fixes from at least four satellites.

But of course your calculated position is one that's relative to the location of the satellites – to convert this into a position on the Earth's surface further trigonometric calculations need to be made using the locations of the satellites relative to the Earth. The more different satellites used, the more accurate the position fix will be, up to the theoretical limit of about 3m for the C/A signal – in practice, with good reception, accuracy should be within about 30m for around 95 per cent of the time.

I can see clearly now
The high radio frequencies used mean that the receiver needs a clear line of sight to each satellite – obstructions such as trees, buildings or your car's roof can degrade or block the incoming signals. The radio signal can also bounce off obstructions creating what's known as multipath interference. This has been one of the major drawbacks of using GPS for route guidance – driving through wooded areas or urban streets can render the system useless. Fortunately, this is one area where the boffins have been very active over the past few years, and using some clever electronic tricks it's now possible to maintain navigation information in difficult areas.

For my next trick
One such trick relies on the fact that you're generally constrained to the existing roads. As long as you can get a partial fix, the system can make a pretty good guess as to

where you are for brief periods of poor reception, and so would keep tracking you along the last known road until it could get a new fix. You can often see this in action if you turn down an unmarked track or lane – for some moments the GPS will still track you along the nearest road.

Other tricks use complex signal processing algorithms to correct the multipath distortions in built-up areas or indoors. A GPS linked to heading and speed sensors in a vehicle can navigate in the most difficult urban environments. Hybrid phone-based systems are also appearing: Qualcomm's Snaptrack system augments satellite fixes with range information gleaned from cellular base stations sent via GSM/GPRS, CDMA or UMTS networks. This is known as Assisted GPS (A-GPS) and allows reliable positioning in difficult environments. In the US, users have access to the Wide Area Augmentation System, a system of base stations and satellites that provides realtime corrections to GPS data and allows accuracies of around 3m without the need for special equipment.

Are you receiving me?
Receiver technology has improved beyond recognition – modern low-cost Bluetooth or wired receivers have incredible sensitivity and offer 12 or more parallel radio channels to simultaneously communicate with several satellites, which improves the speed and accuracy of a fix. Older and cheaper models use a single radio channel and scan quickly between satellites (multiplexing) – you should avoid these. When a receiver's turned on after a long period of inactivity ('cold start') it needs to search the whole sky to work out which satellites are where, which in the early days could take 10-15 minutes. These days, cold start times of less than a minute are the norm.

Two's company
Although there are lots of GPS software applications, it's worth realising that there are only two companies providing the raw map data the applications are based on – Navteq and Tele Atlas. These companies use armies of field staff whose sole task is to scout the highways and byways verifying and checking map information – although they also work with national mapping agencies to update major changes to the road infrastructure.

Major map updates are infrequent, and not usually free. The accuracy of the base maps generated from the same raw data should be identical – it's the design of the user interface and range of other added features that varies between programs. *Kelvyn Taylor*

GPS

MANUFACTURER	AA	ALK	DESTINATOR TECNOLOGIES	NAVICORE	NAVIGON	ROUTE 66	TOMTOM	VIAMICHELIN
	Computer World RECOMMENDED			Computer World EDITOR'S CHOICE		Computer World RECOMMENDED		
Product	Navigator	Copilot Live 6	Destinator PN	Personal	Mobile Navigator 5	Mobile Britain 2006	Navigator 5	Navigation 3
Price (software only)	£99	£134.99	£99.99	£129.95	£89.99	UK: €149 (£101 approx); Europe: €249 (£169 approx)	European: €199 (£135 approx) (Windows and Palm)	UK: £87.99, Europe: £149.99
Telephone	0870 420 2722	None	0870 027 2127	0845 055 0728	0870 712 0602	+31 180 413 825	None	09010 234 0000
URL	www.theaa.com	www.alk.com	www.destinator europe.com	www.navicore tech.com	www.navigon. com	www.66.com	www.tomtom. com	www.via michelin.com
PLATFORMS								
Palm OS	✗	✗	✗	✗	✗	✗	✔	✔
Symbian UIQ	✗	✗	✗	✔	✗	✔	✔	✗
Symbian 60/60	✗	✗	✗	✔	✗	✔	✔	✗
Windows Mobile	✔	✔	✔	✗	✔	✗	✔	✔
MAP COVERAGE								
Map data supplier	Navteq	Navteq	Navteq	Tele Atlas	Navteq	Navteq	Tele Atlas	Tele Atlas
European maps supplied	✗	✗	✔	✔	✔ (Home country activated)	✗	Not with GPS bundle	Depends on version
Additional maps available	✗	✔	✗	✗	✔	✔ (European)	✔ (€199)	✔
OTHER FEATURES								
Traffic info	✗	✔ (via GPRS)	✔ (via TMC)	✗	✔ (via TMC)	✔ (via GPRS)	✔ (via GRPS €59.95 per year)	✗
Location messaging	✗	✔	✔	✔	✗	✗	✗	✗
Postcode input	✔ (7 digits)	✔ (7 digits)	✗	✗	✗	✔	✔	✗
3D map view	✗	✔	✔	✔	✔	✔	✔	✔
Day/night colour schemes	✔	✔	✔	✔	✔	✔	✔	✔
Track recording	✗	✗	✗	✗	✗	✗	✗	✗
Multiple destination/ waypoint support	✗	✔	✗	✗	✔	✔	✗	✗
Other features	None	Live web tracking (via GPRS)	None	None	Logbook	None	Downloadable voices, weather reports, city maps (chargeable)	Links with Michelin Guide for PDA
BUNDLE OPTIONS								
Bundle price including GPS receiver	£229.99	£179.99	N/A	£199.99	£299	€299 (Britain); €399 (European)	€298	From £185
Included in GPS bundle pack	Bluetooth GPS, car mount, memory card	Bluetooth GPS, car mount, memory card	N/A	UK maps, memory card, bluetooth GPS	GPS-enabled Mio168 PocketPC, car mount, CD	Bluetooth GPS, car mount, memory card, card reader, CD	Bluetooth GPS, car mount, memory card for home country only	GPS, car mount, memory card, UK and Ireland maps
SCORES								
Features	★★★☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆
Ease of use	★★☆☆☆	★★☆☆☆	★☆☆☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Value for money	★★★☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆
OVERALL	★★★☆☆	★★☆☆☆	★★☆☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆

Starting from scratch

While the packages we've looked at here are great solutions for those who already have a smartphone or pocket computer, what if you're starting from scratch? Do these still represent good value for money or should you consider one of the alternatives?

Those, broadly speaking, fall into two categories – standalone GPS systems and in-car GPS systems. The former – devices such as Tomtom's Go – are portable units, designed primarily for the car, and incorporate everything you need in one box. In fact, if you've used Tomtom's software, you'll feel right at home with the Go, since it's essentially identical and probably, we suspect, built on the same hardware, with PDA-type functions removed. Other major GPS manufacturers, including Navman, Magellan and Garmin, offer similar units, and you can expect to pay from around £200 up to £350, depending on the features – but as with the packages we've tested, check to see if the maps included are sufficient.

In-car units come in two forms – built-in at the time you order a new car or as part of an after-market car stereo system, from companies such as Alpine, Blaupunkt or Clarion. They have the advantage that they're always there – nothing to fix to the windscreen with suckers – but upgradability is a potential problem. If you have a system from your car's maker, find out how much they'll charge you for replacement CDs or DVDs, for example, if the map discs – which many systems need installed and running all the time – wear out or need updating. While the high-end add-on systems often have extremely good screens – 5in is quite common – they can cost over

All-in-one GPS systems such as Garmin's Street Pilot and Tomtom's Go are an alternative to PDA or Smartphone-based systems

£1,000. Cheaper units, including some factory-fitted ones, may simply display basic text or voice instructions, rather than a map.

For those who want simplicity, an all-in-one box is certainly appealing. But in terms of value for money and future-proofing, we reckon one of the best compromises is a smartphone-based system, coupled with a GPS-enabled Bluetooth car kit (such as the Parrot system pictured on page 71) – one box to carry to the car and it's the device you'd most likely take with you in any case.

Editor's Choice

Navicore Personal

AA Navigator

Route 66 Mobile Britain

While many of the systems we tested are available for more than one type of device, to some degree the choice of what you can buy will be determined at least in part by what hardware you have already. There's another factor too – how far you plan to go.

All the systems we tested have, at least, UK street-level mapping, that's a must – but what about Europe? If you travel abroad, you may at first consider that major roads are all you need; think again. Paris, Berlin, Amsterdam and so forth are actually pretty big targets and hard to miss – where you really need

information is in the suburbs and city centres, making full European details essential for international drivers.

Ease of use is important too, and we found some of the Windows-powered devices a little fiddly in that respect, too reliant on the stylus to change options or enter addresses. Given the need for a cradle, you really want to be able to poke the screen, rather than wield a stylus.

For its ease of use, notwithstanding some quirks, we give a Recommended award to AA Navigator and to Route 66 Mobile Britain, with its built-in traffic updates – or it's European counterpart.

But for sheer simplicity, good coverage and the possibility of one less box needed in the car, we give our Editor's Choice award to Navicore Personal for Symbian Series 60/80 smartphones. It performed well, made good use of the device's abilities, provided comprehensive maps and works on the most popular smartphone platform. **PCW**

A seasonal feast

If you're searching for a system that will keep the whole family entertained this Christmas, look no further. Anthony Dhanendran unwraps six tasty setups with all the trimmings

'The winners are those with the best combination of performance, features and value for money'

As Christmas is just round the corner, we've challenged six top PC vendors to supply the ultimate holiday bundle. We asked each company to come up with a bundle that included a PC base unit (with or without monitor), keyboard, mouse, and at least one other piece of hardware.

This could include a digital camera, printer, scanner, speakers or another similar device that will let anyone who buys one of these PCs for Christmas get straight down to business, without having to go scouring the bargain racks for the extra bits and pieces.

Of course, cost is always an issue, especially around the festive season, so we set an upper limit of £1,200 including VAT. Other than that,

we left it up to the vendors to decide what would go into each package.

We were looking for an all-round PC that could be comfortably used by the whole family, from younger children taking their first steps on the Internet, to the office and productivity applications used by those forking out the cash.

As ever, we put each PC through its paces in the *PCW* Labs, using stringent benchmark tests.

We've assessed each one taking into account both the overall bundle and the performance of the computer at the core of each package. The winners are those with the best combination of performance, features and value for money, so if you fancy the idea of Christmas huddled around a roaring PC, read on.

↘

Cube247 Omega

Price £1,200 **Contact** www.cube247.co.uk

Cube247's offering differs from the other systems in that it is designed primarily as a media centre. That means it doesn't come with a screen as standard, and it runs Windows XP Media Center Edition (MCE) rather than the Home Edition installed on most of the other systems on test.

It also has the largest amount of hard drive space the group – its two 200GB drives total a whopping 400GB. This is ideal for storing large multimedia files such as videos and music, and is perfect for recording TV via the MCE operating system.

Fittingly, it comes in a Shuttle-style small form factor (SFF) case. There is very little room inside for expansion, as the two hard drives, an optical drive and a Hauppauge digital TV tuner card take up much of the space.

Despite its diminutive size, the Omega has an Athlon64 4000+ processor and the obligatory 1GB of Ram, as well as an ATI X800XL graphics card with 256MB of video memory.

These components helped it to a Sysmark 2004 SE score of 204, roughly in the middle of the group. It also managed an impressive score of 5,139 in 3Dmark05.

In addition to the Microsoft wireless keyboard and mouse plus the standard MCE remote control, the computer comes with a soft carry case for the main unit – ideal for taking it to Lan parties.

More usefully, the computer is bundled with a BTC SG104A music player. This is a 4GB hard disk-based device that has a large backlit screen and can be used as a voice recorder.

There's a set of Creative P5800 5.1 speakers and, although it doesn't come with a monitor, the computer is designed to be hooked up to a television and used as the hub for home entertainment, a job for which it is certainly very suitable.

Verdict

Pros Compact size; lots of storage space
Cons No monitor; no room to upgrade
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall Great if you want a multimedia hub, but the lack of a monitor affects value for money
★★★★★

The Omega lacks composite and component video outputs

Evesham Axis X2 Thunder

Price £1,200 **Contact** www.evesham.com

Evesham is the only vendor other than Mesh to include an Athlon64 X2 processor in its system and, although it is the low-end 3800+ model, it allowed the computer to comfortably achieve second place in the Sysmark and 3Dmark tests.

The graphics card is an ATI Radeon X850 Pro with 256MB of Ram. This produced a superb score of 5,294 in 3Dmark05, and it reached 61.28 frames per second in Far Cry.

The Axis X2 Thunder uses an SLI (scalable link interface) motherboard, although you won't be able to make use of it with the ATI graphics card. It would have made more technical sense for Evesham to supply an ATI Crossfire-capable motherboard, which would have had the potential to use a dual graphics card setup.

The Viewsonic VX715 monitor's display quality is rather good, but it is only a 17in model. It has the same 1,280 x 1,024 resolution as most 19in panels, which is adequate, but a 19in offering would have been more impressive.

As well as Windows XP Home Edition, the PC comes preloaded with Microsoft Works 8.5, Roxio Easy Media Creator 7 and Bullguard anti-virus software.

Evesham has also provided a set of Creative P5800 5.1 surround-sound speakers and a Creative Zen Nano Plus 512MB portable music player.

You also get a Canon MP150 multifunction colour inkjet printer that can also scan and copy.

There aren't any other bells and whistles but, despite this, the Axis X2 Thunder is hard to fault.

It has a good software bundle containing everything you'll need to start creating or editing digital media and documents, and has the reassurance of a two-year on-site warranty (the third year is return-to-base only). This PC is a great choice for the family and wins a Recommended award.

Verdict

Pros Performance; mp3 player
Cons Small monitor; choice of motherboard
Features ★★★★★
Performance ★★★★★
Value for money ★★★★★

Overall Good performance in all areas, but its 17in monitor is a disappointment
★★★★★

A welcome inclusion is the Creative Zen Nano Plus 512MB portable music player

HP Pavilion m7151.uk

Price £1,243 **Contact** www.hp.co.uk

Unlike all the other manufacturers in our group test, HP has chosen to use an Intel Pentium 4 processor clocked at 3GHz.

The 1GB of Ram that is standard across all six submissions is to be expected from a PC at this price. However, the amount of storage is the lowest in the group, at 160GB, compared with the median of 250GB, and far lower than the 400GB offered by the PC with the largest storage space. This is

disappointing but is still a fair amount of space, and should last most people for some time.

The PC uses an ATI Radeon X300SE, which is one of the lowest-specified graphics cards in the test. This affects the PC's ability in graphically demanding applications. It struggles more with modern games when high levels of detail are applied, although it's perfectly capable of a good performance with most mainstream titles.

The PC runs the Media Center Edition (MCE) of Windows XP and it comes with a Hauppauge TV tuner card installed for this purpose, as well as the standard Media Center remote control. You also get a set of 2.1 speakers, an HP Photosmart 3210 multifunction colour inkjet printer, and a 21in F2105 TFT monitor.

As with many new HP PCs, the top of the case has a dock mounting point so that an HP camera can be attached, although there's no dock supplied – you'll have to buy one from HP.

There is a reasonable software package in addition to Windows, consisting of Microsoft Works 8, Sonic disc-burning software and HP's Image Zone application.

As we were going to press HP told us it is now unable supply the m7151.uk at the price point set for this group test. It has confirmed a new price of £1,243. This, in addition to the rather lacklustre specification makes the PC difficult to recommend.

Verdict

Pros Large display; good multimedia features courtesy of Windows MCE
Cons Pricey; uninspiring performance

Features	★★★★★
Performance	★★★★★
Value for money	★★★★★

Overall Includes a good 21in monitor, but has a lower specification and is pricier than all its rivals

★★★★★

This widescreen 21in TFT is ideal for watching TV via Windows XP Media Center Edition

Intellect Prodesk A64/3200+

Price £1,200 **Contact** www.intellect.uk.com

The Intellect Prodesk A64/3200+ uses an Athlon64 3200+ processor, the lowest-rated of all the systems in the group test. Accordingly, it fares poorly against most of its rivals, although its Sysmark 2004 SE rating of 175 isn't too far behind the HP's 182.

The PC includes an ATI Radeon X800 GT graphics card, with 256MB of Ram, so it did reasonably well in our Far Cry tests, achieving 58.78 frames per second.

What the Prodesk A64/3200+ lacks in firepower it makes up for somewhat in accessories. Intellect is the only vendor to include a digital camera with its PC, as well as a good-quality Viewsonic 19in TFT monitor.

The camera is a Lumicron 8megapixel model which, although not a very well-known brand, produces decent images. The supplied printer is an HP PSC1610 multifunction colour inkjet. The Prodesk A64/3200+ joins the Zoostorm and HP PCs in providing a memory card reader built into the front panel of the case, a good addition that helps you transfer images between the camera and PC.

The supplied software includes Microsoft Works Suite 2006 and Nero 6. You also get a Microsoft wireless keyboard and mouse set and Windows XP Home. A set of Creative Inspire P5800 5.1 speakers completes the package.

Despite the well-specified accessories and software that come with this PC, it's difficult to recommend, given its relatively low test scores.

Although it is perfectly adequate as a family PC – it's more than happy running games, office and Internet applications – there are better bargains around. Anyone interested in the Prodesk A64/3200+ may be better off getting a version with a faster processor, although this would obviously increase the total cost.

Verdict

Pros Good selection of accessories
Cons Unimpressive performance

Features	★★★★★
Performance	★★★★★
Value for money	★★★★★

Overall A fairly adequate all-rounder with good extras, but it trails behind its rivals in several areas

★★★★★

The Lumicron 8megapixel camera produces good images

Mesh Matrix Vector Xmas

Price £1,200 **Contact** www.meshcomputers.com

Mesh's festively named Matrix Vector Xmas is one of two PCs in this group test to use a dual-core AMD Athlon X2 processor. This won't double your PC's speed, but it means you should spend less time looking at the Windows hourglass if you're running lots of applications at once.

The Mesh's scores in our multi-tasking Sysmark test showed a definite advantage over the other PCs. It wasn't double the score of its single-core rivals, but the X2 4200+ impressed with an overall Sysmark 2004 SE score of 232 – the highest in the test.

Like the other PCs it contains 1GB of Ram as well as a 200GB hard disk. This isn't a huge amount of storage, but it should be enough for most users.

While its graphics scores are significantly better than those of the HP submission, it falls short of the rest of the group, scoring 3,747 in 3Dmark05. This is largely because it comes with an Nvidia Geforce 6800, which, although equipped with 256MB of memory, is less powerful than the cards in most of the other systems.

That said, it managed a respectable 66.3 frames per second in Far Cry, showing that it is more than capable of running modern games with high levels of detail.

The screen is a 19in Viewsonic VX924 flat panel that comes with a Logitech cordless keyboard and mouse set.

Impressively, Mesh has managed to include the new X-Fi Xtreme Music soundcard from Creative, as well as a set of T7900 7.1 speakers.

The bundle is completed by a Lexmark X7170 multifunction colour inkjet printer. There is also a decent software selection including Microsoft Works 8.5, PowerDVD, Power Producer 3, and other media and disc-burning software.

All in all, this is an impressive system with better core performance than most of its rivals.

Verdict

Pros Dual-core processor; modern soundcard
Cons Graphics performance not top-notch

Features	★★★★☆
Performance	★★★★★
Value for money	★★★★☆

Overall Strong all-round performance makes this PC the best choice for demanding users

★★★★☆

The Lexmark X7170 is large but delivers very good results

Zoostorm 5-6401 Family PC

Price £1,200 **Contact** www.pcnextday.co.uk

The Zoostorm 5-6401 Family PC is based around an AMD Athlon64 4000+ processor, 1GB of memory and an ECS Nforce4-939 motherboard. Its most impressive feature, however, is the graphics card – an Nvidia Geforce 7800GT with 256MB of video memory. This packs quite a punch, and takes the PC to the top of the table for graphics.

It managed 76.42 frames per second in Far Cry and 6,842 in 3Dmark05.

Despite this impressive graphics performance, the PC still came third in general performance, behind the Mesh and the Evesham PCs, with a still respectable Sysmark 2004 SE score of 212.

Like two of the other computers it comes with a 250GB hard disk. The screen is a 19in AOC flat panel and you also get quite a bundle of extra hardware.

Printing and scanning is taken care of by the HP PSC1410 multifunction inkjet device, while there are a pair of Genius gamepads to take full advantage of the system's excellent capabilities.

Unusually, you also get a wireless broadband modem/router, and a wireless Lan card installed in the PC. This is an interesting addition, especially if you want to position the PC in a separate room to your phone line.

The router comes with a microfilter, ideal if you're thinking of buying a 'wires-only' ADSL package; plus there's a Speed i640 webcam and a set of 2.1 Zoostorm speakers.

You also get a spindle of 50 DVD+R blank discs, and a 12-in-1 memory card reader. For those of you who insist on clinging to the past, there's a floppy disk drive.

This PC has a lot going for it and, although it doesn't have a fast dual-core processor, there is little here to fault.

Verdict

Pros Graphics card; wireless Lan capabilities
Cons Average general performance

Features	★★★★★
Performance	★★★★☆
Value for money	★★★★★

Overall A winner, thanks to its solid specification and astonishing graphics performance

★★★★★

Image quality on the Speed i640 webcam isn't great, but it is useful for videoconferencing

↘

Gadget corner

For those of you who want to buy some of the bundled accessories separately, here's what you can expect

Creative Inspire P5800 speakers
While a 7.1 speaker setup looks attractive, there are few 7.1 soundtracks available, so the P5800 5.1 package is perfectly adequate for most uses. The sound quality is not as clear as that of more expensive speakers, but it has an upmix facility to pump stereo soundtracks through seven speakers.
Overall ★★★☆☆

Creative Inspire T7900 speakers
The T7900's speakers have tweeters and mid-range drivers to provide well-balanced audio. The overall quality won't impress demanding audiophiles, but this is a good setup for anyone looking to get started with surround sound.
Overall ★★★★☆

Lexmark X7170
The X7170 is more aimed at offices than families, with a document feeder and the ability to fax in colour. It works well in both printing and scanning modes and can be used with a photo cartridge that provides good-quality results on suitable paper. It's quite fast for printing black text (up to 22 pages per minute), but colour photo printing can be far slower.
Overall ★★★★☆

Canon MP150 multifunction device
Canon's latest multifunction device is an all-in-one model that is capable of producing high-quality photo prints. It's not much bigger than a high-end inkjet, although it is a little larger than some rivals.

It doesn't have an LCD preview screen and scanning speed is slow, but it prints at a reasonable seven pages per minute.
Overall ★★★★☆

BTC SG104A audio player
This player comes from a relatively unknown company, but it offers 4GB of storage for music files, of which it will play mp3, wma, ogg and wav files. It's not particularly large, and is quite light at 108g. The backlit LCD is generously sized at 1.7in and it comes with earphones and a strap.
Overall ★★★☆☆

HP Photosmart 3210 multifunction device
This multifunction device is bigger than the PSC1610 (see page 88) but offers better quality printing and has a 6.4cm LCD panel, so it's possible to print pictures directly without a PC being attached and without an index print. It comes with HP's recirculation technology, which is designed to reduce ink wastage.
Overall ★★★★☆

Creative Zen Nano Plus 512MB
Although it can't match Apple's similarly named Ipod Nano for capacity, Creative's Zen Nano Plus is small and packed with useful features, such as a radio. It will keep going for up to 18 hours on a single AAA battery. It's also possible to use it as a Dictaphone via the built-in microphone or the line-in socket, and it will record mp3 files.
Overall ★★★★★

Genius Maxfire G-08XU
This game controller looks a lot like it's based on Microsoft's Xbox controller, which is no bad thing. There are four standard face buttons and a D-pad, as well as four shoulder buttons. No drivers are required for Windows 98, ME, 2000 or XP PCs.
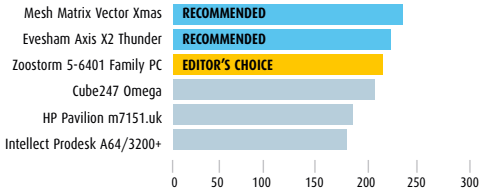**Overall** ★★★☆☆

Lab results

Despite their similar prices, each PC in this test has its forté in different application types. The following graphs illustrate how they compare
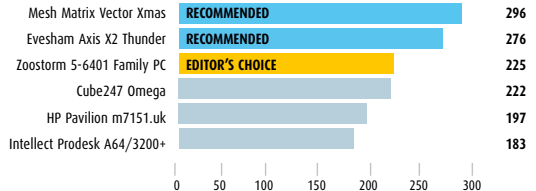
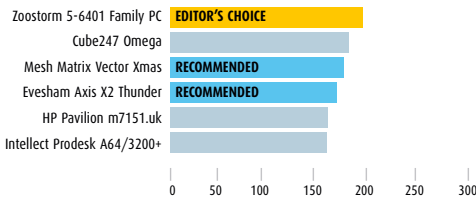## Sysmark 2004 SE (overall)

Bigger is better

PC		Score
Mesh Matrix Vector Xmas	RECOMMENDED	232
Evesham Axis X2 Thunder	RECOMMENDED	220
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	212
Cube247 Omega		204
HP Pavilion m7151.uk		182
Intellect Prodesk A64/3200+		175

0　50　100　150　200　250　300

Sysmark 2004 SE Internet content creation

Bigger is better

PC		Score
Mesh Matrix Vector Xmas	RECOMMENDED	296
Evesham Axis X2 Thunder	RECOMMENDED	276
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	225
Cube247 Omega		222
HP Pavilion m7151.uk		197
Intellect Prodesk A64/3200+		183

0　50　100　150　200　250　300

Sysmark 2004 SE office productivity

Bigger is better

PC		Score
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	199
Cube247 Omega		187
Mesh Matrix Vector Xmas	RECOMMENDED	182
Evesham Axis X2 Thunder	RECOMMENDED	176
HP Pavilion m7151.uk		168
Intellect Prodesk A64/3200+		167

0　50　100　150　200　250　300

3Dmark05 (1,024 x 768 in 32bit colour)

Bigger is better

PC		Score
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	6,842
Evesham Axis X2 Thunder	RECOMMENDED	5,294
Cube247 Omega		5,139
Intellect Prodesk A64/3200+		3,994
Mesh Matrix Vector Xmas	RECOMMENDED	3,747
HP Pavilion m7151.uk		817

0　1,000　2,000　3,000　4,000　5,000　6,000　7,000
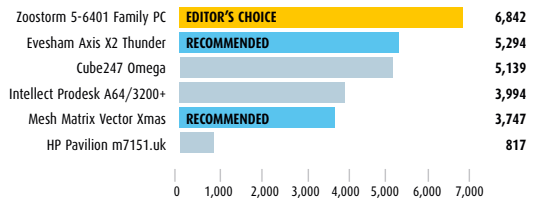
Far Cry (1,024 x 768 in 32bit colour)

Bigger is better

PC		Score
Cube247 Omega		79.42
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	76.42
Mesh Matrix Vector Xmas	RECOMMENDED	66.3
Evesham Axis X2 Thunder	RECOMMENDED	61.28
Intellect Prodesk A64/3200+		58.78
HP Pavilion m7151.uk		15.98

0　10　20　30　40　50　60　70　80
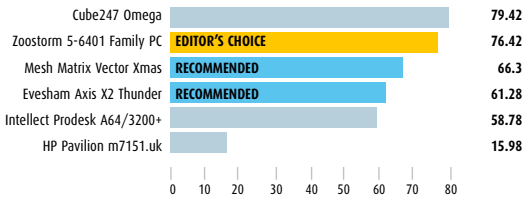
PCmark05 (overall)

Bigger is better

PC		Score
Evesham Axis X2 Thunder	RECOMMENDED	5,123
Mesh Matrix Vector Xmas	RECOMMENDED	4,946
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	4,242
Cube247 Omega		4,142
Intellect Prodesk A64/3200+		3,472
HP Pavilion m7151.uk		2,786

0　1,000　2,000　3,000　4,000　5,000
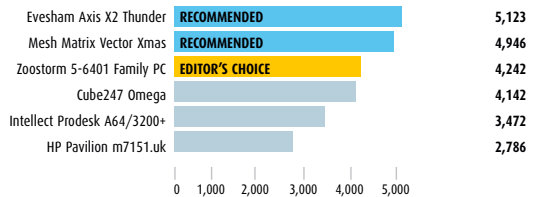
Cinebench – 1 CPU

Bigger is better

PC		Score
Cube247 Omega		340
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	339
Mesh Matrix Vector Xmas	RECOMMENDED	312
Evesham Axis X2 Thunder	RECOMMENDED	290
Intellect Prodesk A64/3200+		284
HP Pavilion m7151.uk		260

0　50　100　150　200　250　300　350
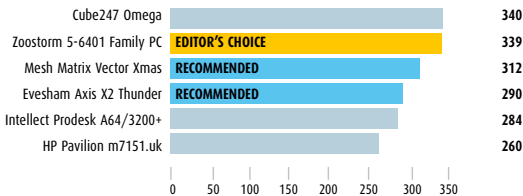
Cinebench – 2 CPUs

Bigger is better

PC		Score
Mesh Matrix Vector Xmas	RECOMMENDED	584
Evesham Axis X2 Thunder	RECOMMENDED	544
HP Pavilion m7151.uk		315
Cube247 Omega		N/A
Intellect Prodesk A64/3200+		N/A
Zoostorm 5-6401 Family PC	EDITOR'S CHOICE	N/A

0　100　200　300　400　500　600
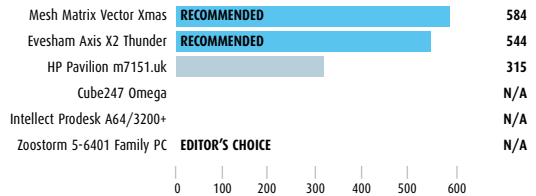
Cinebench explained

Cinebench (www.cinebench.com) is a free, multithreaded 3D-rendering benchmark that's based on the Cinema 4D professional software application for 3D designers. Cinebench measures how good the PC's 3D graphics subsystem is at rendering complex video and 3D animations. It can use a single CPU or up to 16 CPUs if available, showing you how much the performance increases when multiple CPUs are used. Rendering is done in software, and using OpenGL hardware acceleration if this is available on the graphics card. We used Cinebench to measure the performance of those computers with dual-core CPUs. This test doesn't apply to PCs with single-core CPUs, except the Hyperthreading-enabled Pentium 4, which can function as two virtual processors by dividing tasks into two threads.

£1,200 PC bundles
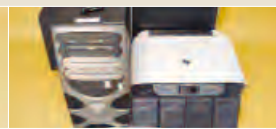
	CUBE247	EVESHAM	
MANUFACTURER	**CUBE247**	**EVESHAM**	
Model name	Omega	Axis X2 Thunder	
Price inc VAT	£1,200	£1,200	
Sales phone	0870 242 1179	0870 160 9500	
URL	www.cube247.co.uk	www.evesham.com	
Processor	AMD Athlon64 4000+	AMD Athlon64 X2 3800+	
HARDWARE SPECIFICATIONS			
Motherboard	Biostar iDEQ 330P	MSI-K8N SLI	
Chipset	Nvidia Nforce4	Nvidia Nforce4 SLI	
Available memory/type	1GB DDR400	1GB DDR400	
Occupied/spare Ram slots	2/2	2/2	
Max memory in this configuration/Max supported by m'bd/hard disk size	2GB/2GB/400GB (2 x 200GB)	2GB/4GB/250GB	
EXPANSION AND I/O			
No of 3.5in/5.25in bays	2/1	4/4	
No of free 3.5in/5.25in bays	0/0	3/2	
No of PCI/AGP/x16 PCI Express slots	1/0/1	3/0/2	
No of free PCI/AGP/x16 PCI Express slots	0/0/0	3/0/1	
No of USB2/Firewire ports/serial/parallel/PS2 ports	6/2/2/0/2	6/2/1/1/2	
MULTIMEDIA			
Primary optical drive	NEC ND-3540A	Sony DW-Q28A	
Primary optical drive formats and speed (max)	DVD+/-R: 16x, DVD+/-RW: 4x, DVD+R9: 4x	DVD+/-R: 16x, DVD-RW: 6x, DVD+RW: 8x, DVD DVD+/-DL: 4x	
Secondary optical drive	None	Sony DDU1615	
Secondary optical drive formats and speed (max)	N/A	16x DVD	
Soundcard	Integrated Realtek ALC850	Integrated Realtek ALC850	
Speakers	Creative Inspire P5800	Creative Inspire P5800	
Graphics chip/memory	ATI X800XL/256MB	ATI Radeon X850 Pro/256MB	
Monitor/size/maximum resolution	No monitor	Viewsonic VX715/17in/1,280 x 1,024	
OTHER			
Modem	None	None	
Networking	Nvidia Nforce4	Nvidia Nforce4	
Operating system	Windows XP Media Center	Windows XP Home SP2	
Bundled software	Nero 6 Suite, PowerDVD 6, Windows MCE	Roxio Easy Media Creator 7, Microsoft Works 8.5, Bullguard anti-virus	
Bundled hardware	Hauppauge Digital TV tuner (internal), Creative P5800 speakers, BTC 4GB audio player, Microsoft Wireless desktop, Media Center remote control, carry case	Creative Zen Nano Plus mp3 player, Canon MP150 MFD, Creative P5800 speakers, Microsoft cordless keyboard, Microsoft optical tilt mouse	
Standard warranty (RTB = return to base)	Three years RTB	Two years on site then one year RTB	
SCORES			
Features	★★★☆☆	★★★★☆	
Performance	★★★☆☆	★★★★★	
Value for money	★★★☆☆	★★★★☆	
OVERALL	★★★☆☆	★★★★☆	

Vendors of group test products are only obliged to sell them at the prices quoted here (which include delivery and credit card surcharges) for the life of this PCW issue. They may also change components under certain circumstances.

	HP	INTELLECT	MESH	ZOOSTORM
	Pavilion m7151.uk	Prodesk A64/3200+	Matrix Vector Xmas	5-6401 Family PC
	£1,243	£1,200	£1,200	£1,200
	0845 270 4215	08701 225 590	0870 046 4747	N/A
	www.hp.com/uk	www.intellect.uk.com	www.meshcomputers.com	www.pcnextday.co.uk
	Intel Pentium4 3GHz	AMD Athlon64 3200+	AMD Athlon64 X2 4200+	AMD Athlon64 4000+
	Asus PTGD-LA	Asus A8N-E	Asus A8N-E	ECS Nforce4-939
	Intel i915GV	Nvidia Nforce4 Ultra	Nvidia Nforce4 Ultra	Nvidia Nforce4
	1GB PC3200 DDR2	1GB DDR400	1GB DDR400	1GB DDR400
	2/2	2/2	2/2	2/2
	2GB/4GB/160GB	2GB/4GB/250GB	2GB/4GB/200GB	2GB/4GB/250GB
	1/3	6/4	4/3	4/3
	0/2	4/2	2/1	1/1
	3/01	3/0/1	3/0/1	3/0/1
	1/0/1	1/0/0	1/0/0	0/0/0
	6/2/0/1/2	8/0/0/1/2	8/0/0/1/2	6/4/1/1/2
	HP DVD Writer 640c	OEM DVD-Rom	Sony DDU1615	Philips DROM5016L
	DVD+R: 16x, DVD-R: 8x, DVD+RW: 4x, DVD-RW: 4x, DVD+R9: 24x	16x DVD	16x DVD	16x DVD
	None	NEC DVD-RW ND-4550A	Sony DW-Q28A	Philips DVDR1628P1
	N/A	DVD+R: 16x, DVD+RW: 8x, DVD-RW: 6x, DVD+R9: 6x, DVD+Ram: 5x	DVD+/-R: 16x, DVD-RW: 6x, DVD+RW: 8x, DVD DVD+/-DL: 4x	DVD+R: 16x, DVD-R: 16x
	Integrated Realtek ALC880	Integrated Realtek ALC880	Creative SB X-Fi	Integrated Realtek ALC665
	HP 2.1 speakers	Creative Inspire P5800	Creative Inspire T7900	Zoostorm S2176
	ATI Radeon X300SE/128MB	ATI Radeon X800GT/256MB	Nvidia Geforce 6800/256MB	Nvidia Geforce 7800GT/256MB
	HP F2105/21in/1,680 x 1,080	Viewsonic VA902/19in/1,280 x 1,024	Viewsonic VX924/19in/1,280 x 1,024	AOC LM928/19in/1,280 x 1,024
	Agere Soft PCI	None	Soft V.92	Intel 537EP/Edimax ADSL modem
	Realtek RTL8139	Nvidia Nforce4	Nvidia Nforce4	Nvidia Nforce4
	Windows XP Media Center	Windows XP Home SP2	Windows XP Home SP2	Windows XP Home SP2
	Microsoft Works 8, Sonic Digital Media Plus 7, HP Image Zone Plus	Microsoft Works Suite 2006, Nero 6, Office 2003 60-day trial	Microsoft Works 8.5, Cyberlink PowerDVD 5 (2CH) (DVD playback), Power2Go 4 (Data burning), Power Producer 3 (DVD authoring), Power Director 3 (Video editing), Mediashow SE (Slideshows), PowerDVD Copy (Power Backup Copy) + Power Cinema 4 (4 Modules DVD, Video, Photo, Music), 60-day Microsoft Office trial	Cyberlink PowerDVD 5, Nero 6
	Hauppauge WinTV-PVR, HP Photosmart 3210 MFD, HP 2.1 speakers, Media Center remote control	Lumicron LDC828z3 camera, HP PSC1610 MFD, Creative P5800 speakers	Lexmark X7170 MFD, Creative T7900 speakers, Creative Soundblaster X-Fi (internal), Logitech cordless desktop	2 x Genius Maxfire F-08XU USB gamepads, HP PSC1410 MFD, Edimax AR-7024WG ADSL modem/router, Microsoft Wireless Optical Desktop 3.0, Speed i640 webcam, Zoostorm S2176 speakers, ADSL microfilter, 50 DVD+
	One year RTB	One year RTB	One year on site then two years RTB	1 year RTB
	★★☆☆☆	★★★★☆	★★★★☆	★★★★★
	★★☆☆☆	★★★☆☆	★★★★★	★★★★★
	★★☆☆☆	★★★☆☆	★★★★☆	★★★★★
	★★☆☆☆	★★★☆☆	★★★★☆	★★★★★

(*Continued from page 84*)

Lumicron LDC-828Z3 camera

Although Lumicron is not a well-known name, this is a sturdily built camera that offers an 8megapixel CCD and a decent 3x optical zoom lens. It takes SD cards and comes with a rechargeable battery and a case, and the image quality is good.

Overall ★★★☆☆

HP PSC1410 multifunction device

This is a small all-in-one device with media card slots, which can print images from memory cards. However, as there is no colour LCD panel, it's necessary to create an index print first. The printer comes with a three-colour cartridge and there is a photo-printing cartridge available for better image quality.

Overall ★★★☆☆

Edimax AR-7024WG ADSL Modem/Router

This 802.11g wireless router has all you need to set up wireless Internet sharing for a standard DSL broadband connection, with four Lan ports for connecting wired PCs or devices. There's a built-in Network Address Translation firewall and lots of advanced features, but the router's web configuration interface may be daunting for novices. It isn't as fast as routers operating on a 'pre-N' wireless standard, but it is ideal for sharing an Internet connection or streaming media files around the home.

Overall ★★☆☆☆

Speed i640 webcam

This tiny camera connects via USB to the PC and can take video at 12 frames per second. It has good build quality but its lens is small so don't expect perfect images. It is ideal for web-conferencing or taking quick portraits, and it can act as a basic home-surveillance system.

Overall ★★★☆☆

Editor's Choice

Editor's Choice Zoostorm 5-6401 Family PC
Recommended Mesh Matrix Vector Xmas • Evesham Axis X2 Thunder

Zoostorm 5-6401 Family PC

For sheer performance, it's hard to beat the Mesh Matrix Vector Xmas, but the Zoostorm 5-6401 Family PC just pips it to win the Editor's Choice award for its massive array of included gadgets and gizmos.

Although it's not the fastest PC in the test, its Sysmark score of 212 is certainly competitive when compared to the Mesh. Ultimately, though, it is the Zoostorm's superior graphics performance that really gives it the edge.

Game playing is likely to be the most punishing task for a family PC, and here the Zoostorm excels. It's let down a bit by the two-channel speakers and sound performance from the integrated chip is inferior to Mesh's discrete soundcard, but it's a great graphics performer.

For performance in other areas, such as video editing and large-scale photo editing, the Mesh system has the advantage. Its dual-core processor excels when dealing with the complex calculations involved in these tasks, which is why Mesh gets a Recommended award.

Although it doesn't have the same number of accessories as the Zoostorm, it comes with a printer and a set of surround-sound speakers. It was also the only PC in the group to feature a separate soundcard. The Creative X-Fi Xtreme Music is an excellent device and we are likely to see it used more often in high-end PCs.

The Mesh was unbeaten for overall performance and, despite being bettered during 3D applications, it is still no slouch when running demanding games.

The Matrix Vector Xmas is a great all-rounder and will earn its keep as more and more applications become able to take full advantage of dual-core processors.

Our other Recommended award goes to the Evesham Axis X2 Thunder. Although this comes with a relatively small 17in monitor, it's a good-quality model.

The AMD Athlon64 X2 3800+ processor comfortably beats all the others in general performance, apart from the faster Athlon64 X2 4200+ in the Mesh Matrix Vector Xmas, and its graphics performance doesn't disappoint, either. Although its accessories aren't as impressive as those in the Zoostorm, the Canon MFD and Creative music player ensures the bundle makes the grade as a family computer from day one.

Also worth a mention is Cube247's package, which is a decent choice for those seeking a media centre PC. The small form factor means it will fit in well with other electronics in the living room, but its performance was not quite enough to justify an award in this case. **PCW**

'Game playing is likely to be the most punishing task for a family PC, and here the Zoostorm excels'

'There is now an abundance of TV tuner hardware that will turn your computer into a television, complete with recording facilities'

Let your PC entertain you

Watch television, record, timeshift, burn to DVD, all with a PC and suitable software. Rory Reid tests eight applications that can help turn your system into a home cinema and more

The PC is rapidly establishing itself as a credible alternative to the standard television and video/DVD recorder combination. There is now an abundance of TV tuner hardware that will turn your computer into a television, complete with recording facilities.

The range of choice means that choosing the software to control these features can be daunting. Should you splash out on a new PC using Microsoft's Media Center Edition of Windows XP; stick with the third-party software that came with your TV tuner; or opt for a different application entirely in the hope it provides the extra features that will satisfy your needs?

To find out, we tore ourselves away from the latest episode of *Lost* to separate the wheat from the chaff of Home Theatre PC (HTPC) and personal video recorder (PVR) software.

We've looked at the most established titles as well as some little-known offerings, to discover the differences between them.

In order to determine which application is the best, we've considered factors such as whether they allow you to view and control other types of digital media, including DVD, CD, images and audio. We also looked at their support for electronic programming guides (EPGs) and whether their installation and configuration processes are simple or complex.

As well as the reviews, you'll find a workshop showing you some cool ways to turn your computer into the ultimate HTPC, some tricks to get the most from your multimedia setup, and a quick guide to downloading and installing an EPG so you always know what's on. So if you're ready, dim the lights, open the popcorn and let's begin.

Cyberlink Powercinema 4 Digital Tuner Edition

Price £59.83 **Contact** www.gocyberlink.com

Powercinema is a great choice if you want a product that is straightforward to set up and use

Cyberlink is perhaps best known for its Power DVD range of DVD playback products. It's ironic, then, that Powercinema 4, its 'total TV entertainment' software package, lacks any DVD recording features as standard.

To compensate, a digital TV tuner card is included, and the software has an extensive list of features to take advantage of this.

The setup process is simple, our only gripe being the painfully slow channel-scanning process. The user interface is reminiscent of Microsoft's Windows XP Media Center Edition (MCE), which is another boost to its ease of use.

There are distinct menu headings for launching the TV, videos, music, pictures and Internet radio applications, and the software offers all the features you'd expect, including timeshifting and scheduled recording. Internet and Teletext-based EPGs are supported, but you'll have to pay a subscription for the former.

The software is compatible with the Cinemanow movies-on-demand service, which lets you stream feature-length movies from the Internet. This service is a pay-per-view extra, but it is a good addition.

We were fairly impressed by Powercinema 4's audio support. You can browse songs by album, artist or genre, and the package supports custom playlists, too. You also have the option of listening to digital DVB-T (freeview) and FM radio stations.

Disappointingly, there's no support for standard playback of audio CDs – although they can be ripped to your hard drive and played back as wma files.

Powercinema 4 can search your PC for music files, but for some reason it won't automatically look for other media types. In most cases you'll have to manually browse drives and folders to find pictures and movies.

On the whole, Powercinema 4 is an excellent application that should appeal to most users, but it is let down slightly by the lack of DVD recording.

Verdict

Pros Easy-to-use interface
Cons Slow channel scanning
Features	★★★★☆
Ease of use	★★★★★
Value for money	★★★★☆

Overall The most straightforward home-theatre PC software bar Windows XP MCE

★★★★☆

Frey Technologies SageTV 2.2

Price £45.61 **Contact** www.freytechnologies.com

SageTV can learn your viewing habits, which enables it to automatically record your favourite programmes

Unlike the restrictive BeyondTV from Snapstream, SageTV incorporates DVD playback and multimedia file support, so you can watch digital movies, view pictures and listen to music from a single application.

Despite this, our first impressions of the software weren't too positive. The user interface isn't particularly attractive, and the menu system isn't as clear as it could be, with some features not where you might expect them to be in the menu.

There is, for example, no direct way of quitting the program when in full-screen mode – you have to go to the setup page first, exit full-screen mode, then click the close button to the top right-hand side of the program window.

Like most of the software in this group, SageTV has an EPG but no UK-specific listings. You can use the third-party XMLTV application to provide a UK EPG, but the process isn't particularly straightforward or user friendly. To find out what's involved in configuring XMLTV, take a look at the workshop on page 101.

SageTV lacks support for DVB-T (Freeview) cards, which limits it to analogue-only TV tuners. Fortunately it has dual-tuner support, so you can record two or more terrestrial programmes at once. The software can 'learn' about your viewing habits to automatically record episodes of your favourite show, but this feature can be switched off if you prefer to be in total control.

There's no out-of-the-box support for remote scheduling of recordings, but take a look at the SageTV web forums to find information on plug-ins that are available to help you do this.

We found the DVD movie and photo slideshow options useful, but there's no automatic panning and zooming feature during slideshows. Inexplicably, there's no support for playback of audio CDs.

On the whole, SageTV is a powerful TV recording and playback tool, but there are better alternatives that are easier to use.

Verdict

Pros Automatic recording of favourite shows
Cons User interface; analogue-only
Features	★★★☆☆
Ease of use	★★☆☆☆
Value for money	★★★☆☆

Overall Some useful features, such as DVD playback, but the poorly designed interface hinders this software's appeal

★★★☆☆

Meedio Pro

Price £45.77   **Contact** www.meedio.com

Meedio Pro has an attractive interface but, considering its features, it's not a cheap option

Meedio Pro (the commercial incarnation of the open-source MyHTPC) consists of two separate applications; Meedio TV for TV playback and recording functionality, and Meedio Essentials for digital media management.

We initially had mixed emotions after using the program. The setup section is easy to understand, but we had to tell it manually where to look for our multimedia files. Given the relative cost of the application, we expected it to be able to hunt them down by itself.

Meedio was the most problematic of the HTPC software when it came to recognising our TV tuner.

We tried several types, but most of the time we were told Meedio didn't support our chosen card. After perusing the list of supported hardware, we eventually managed to make it work with a Hauppauge WinTV-PVR-150MCE tuner.

We were a lot happier with the way Meedio handled our XMLTV EPG configuration file. After feeding it the required XML data, it happily displayed the programme guide and tuned itself to local stations. Following this, we had no trouble recording single or multiple episodes – thanks in no small part to the software's very attractive user interface.

Unlike some of its rivals, Meedio Pro lets you play DVD movies, but the lack of visualisations during playback of audio CDs means you won't get any fancy graphics moving in time to the music.

On the bright side, Meedio lets you search for programmes by keyword, cast and credits, and channel.

You get decent picture-viewing capabilities, although we were a little miffed that the software didn't provide any transition effects between pictures in a slideshow. You can, however, rotate pictures left or right – handy if some of your pictures aren't in a standard orientation.

On the whole, Meedio Pro is very good, but it is let down slightly by its comparatively high price and limited TV card support.
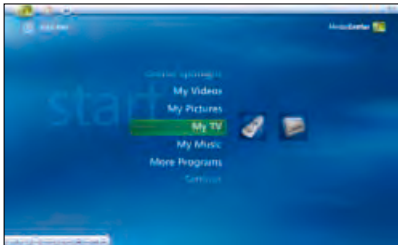
Verdict

Pros Attractive user interface
Cons Costly considering its features
Features ★★★★☆
Ease of use ★★★☆☆
Value for money ★★★☆☆

Overall A very attractive interface helps its cause, but there are cheaper options

★★★☆☆

Microsoft Windows XP Media Center Edition

Price N/A   **Contact** www.microsoft.com

If multimedia capabilities are important to you in a PC, then MCE is probably the best option

Windows XP Media Center Edition (MCE) is a full operating system, but for the purposes of this review we'll just focus on its multimedia capabilities. This latest edition of MCE 2005, Update Rollup 2, is very similar to previous incarnations, but has a couple of slight improvements over its predecessors.

It is available as a free update for current MCE users and, in addition to DVB-T TV, it now supports radio, so you can listen to digital radio broadcasts if your TV tuner supports this. It also has a 'scheduled optimise' function that refreshes MCE services daily to help improve system stability.

More exciting, though, is the updated Media Center Extender feature. This will work in conjunction with the forthcoming Xbox 360 console (and other compatible devices) to stream live TV and other content from your PC to other displays and devices around the home.

You also get improved DVD burning support – you can fit more than an hour of film onto a standard DVD disc. Support for up to four tuners is included, but is only available to US-based users.

Included in this update is an 'away mode' that makes the PC appear to be off while still allowing it to record movies and stream files around the home. However, this feature is hardware-dependent and is only available in some MCE PCs.

Little else has changed, which is a shame. We'd like to have seen picture-in-picture support, as well as support for the DivX encoding format, which is excellent for compressing lengthy videos into small file sizes.

Despite this, MCE is still the best application in its group for accessing your digital media. Setting it up requires little technical knowledge, an EPG is included, and you'll hardly ever need to consult the manual when using it. If you're thinking of buying a new computer, this is probably the best operating system for the media-savvy user.

Personal Computer World EDITOR'S CHOICE

Verdict

Pros Ease of use; Media Center Extender support
Cons No picture-in-picture or DivX support
Features ★★★★☆
Ease of use ★★★★★
Value for money N/A

Overall This update isn't without its omissions, but MCE 2005 Update Rollup 2 is the best way of getting an HTPC

★★★★★

Nero 7 Premium

Price £47.94 **Contact** www.nero.com

Nero 7 Premium offers useful features such as file indexing and an option to view playlists of different media types

Nero is best known for its CD- and DVD-burning software, but the company is attempting to infiltrate the living room with the release of Nero 7 Premium.

The features included in this new version are extensive – it is touted as an all-in-one digital media and home-entertainment solution catering for audio, photo, video and TV.

For the purposes of this group test, we'll concentrate on the Nero Home element of the software. For a more extensive review covering all its features, see page 60.

Nero Home is a media manager that allows access to a user's entire digital media library. After going through an easy installation, it became apparent that Nero 7 Premium places more demand on system resources than the rest of the products in the group. It didn't run slowly, but if you want to build a media hub using relatively old hardware, it may not be the best option.

The program includes a tool called Nero Scout, which is a database that stores the metadata and location of media files. It will index your file collection while Nero Home is running, making it easy to find particular files.

The main menu is split logically between audio, photos, video and TV. There is also a playlists option that helps you view playlists of different media types, but sadly there is no option to create playlists from within Nero Home itself.

We were disappointed by the lack of options for tweaking the TV software and hardware. Aside from enabling or disabling timeshifting and changing the aspect ratio, there's little else to speak of.

There's no support for any sort of EPG, either, and you can't burn recordings to a DVD via Nero Home, which is a real shame.

Nero 7 is an excellent all-round piece of software when you consider its broad list of features. However, its HTPC functions fall short of its more established rivals.

Verdict

Pros File indexing; DVD/CD applications
Cons EPG; No DVD burning from within Nero Home
Features ★★★★★
Ease of use ★★★★★
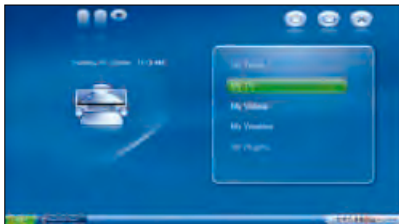**Value for money** ★★★★★
Overall If you're not bothered by its limited HTPC functionality, this is a great all-round multimedia package
★★★★★

Sourceforge Media Portal

Price Free **Contact** http://mediaportal.sourceforge.net

Media Portal costs nothing, but you might find it challenging to set up

Media Portal is an open-source PVR application, which means its source code can be freely obtained and even altered if you have sufficient knowhow.

Like its paid-for counterparts, Media Portal supports TV playback and recording, and will also show videos encoded in various formats including DivX.

We tested version 0.1.3.0 (a more advanced version 2 is being developed) and, not surprisingly, it was more difficult to set up than rivals such as Windows XP MCE or Powercinema 4.

Even the automatic setup wizards have a daunting amount of information to consider and, while it won't be completely alien to anyone with a decent grasp of TV-tuner hardware, novice users should probably steer clear.

Once up and running, there are a number of skins available that change the look of the software. One in particular looks almost exactly like the Windows XP MCE front end, which is a good thing.

As this is an open-source application, we didn't expect Media Portal to have much EPG support, but it works with the XMLTV EPG system. For more details on this, see page 101.

With the EPG configured, it's easy to record a single programme or an entire series with just a few button presses. We also had no problem using the timeshift functions and were pleased to see that there is an option for searching the EPG as well as browsing it.

You can connect a memory card (if your PC has a card reader) containing photos and Media Portal will recognise it as a photo disc.

There are also a couple of games to enjoy, each of which can be controlled via the remote control.

Media Portal may not be the most user-friendly program to configure, but it is one of the best PVR applications we've tested, once you get the hang of things. If you don't want to spend a penny on software and already own a TV tuner card, we'd thoroughly recommend this software.

Personal Computer World
RECOMMENDED

Verdict

Pros Free; skins; TV searching
Cons Not very easy to set up
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★
Overall If you like your software free and don't mind getting your hands dirty, Media Portal is well worth trying
★★★★★

Showshifter 3.12

Price £29.99 **Contact** www.showshifter.com

A good alternative to Media Center Edition, Showshifter 3.12 caters for all your digital media

Showshifter is one of the most well-established PVR applications in the UK. The current iteration, version 3.12, includes support for digital TV tuner cards – although a cheaper analogue-only version is also available.

If you live in a Freeview area with good reception, we recommend going for the digital version, since you can make use of Showshifter's DVB-T radio playback as well as TV.

Like MCE, Showshifter 3.12 caters for all your digital media. You can watch TV, show images, listen to audio CDs and tune into digital radio stations all from the same interface. You can also use it to watch DVDs.

The Showshifter user interface is among the best in this group. Whereas most of its rivals use plain text, Showshifter 3.12 uses an icon-based system. Navigating with unlabelled icons can be difficult in some applications, but the pictures used to represent the program's different functions are easy to interpret.

Showshifter 3.12 has a strong list of TV functions, as you'd expect. We particularly liked the option to change the aspect ratio of any channels you're watching during playback.

However, the product isn't without its faults. Showshifter 3.12 lets you use the subscription-based Digiguide TV guide (www.digiguide.co.uk), but you'll need to install that software first in order to integrate it with Showshifter 3.12.

The music function also has some slight issues, including the fact that you can't browse for tracks by artist or genre. This is a minor gripe, but it could become a major annoyance if you've spent time adding ID3 data tags to your music collection.

Similar problems exist in the digital image section of the software. Showshifter doesn't let you build categories of photos (for example, a particular holiday), so you'll have to manually organise related images into folders.

Despite these issues, Showshifter 3.12 remains one of the best PVR applications on the market and is deserving of our Recommended award.

Verdict

Pros Simple setup; Digiguide EPG support
Cons No artist or genre browsing
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall Not without its faults, but probably the best alternative to buying an MCE PC

★★★★★

Snapstream Media BeyondTV 3

Price £39.39 **Contact** www.snapstream.com

Full of useful features, BeyondTV allows you to watch, pause, record and rewind live TV

The name BeyondTV is somewhat misleading for this product, because TV is all it does. Unlike the all-encompassing Microsoft Media Center, BeyondTV 3 doesn't let you play DVDs, CDs, view photos or watch movies stored on your PC.

What it offers is the ability to watch, pause, record and rewind live TV. It's easy to install, but configuring it isn't very intuitive, as options are split between the application and a separate web-based interface. Neither interface has the full complement of options, so you'll need to flick between them when tweaking settings.

Once up and running, BeyondTV has plenty of good features. It gives you timeshifting control of live TV and great freedom about when and how often programmes should be recorded.

You can also schedule recordings via the Internet, or a Wap mobile phone. If you're away from home and realise you're going to miss the football, you can log on to Snapstream's website to add programmes to your schedule. You'll have to leave your PC switched on and connected to the web, but it is a handy feature.

Unfortunately this version of BeyondTV doesn't support the DVB-T standard, so you can't use it to watch Freeview broadcasts.

BeyondTV helps reduce the chances of a recording conflict. You can prioritise your recordings, so if a clash occurs, at least your favourite of the two will still be recorded. The software can search for another occasion and channel from which to record the other show.

Another useful feature, Smartskip, lets you skip commercials in your recordings by automatically inserting markers at major scene changes to create chapters. It works surprisingly well but can occasionally place markers at inappropriate spots.

BeyondTV 3 is a commendable application. The lack of support for DVD, music and photos is a disadvantage, but strong TV recording abilities make the software a good option.

Verdict

Pros Automatic chapter creation
Cons No DVD/CD or image support
Features ★★★★★
Ease of use ★★★★★
Value for money ★★★★★

Overall BeyondTV 3 has very strong television features, but it lacks options for manipulating other media types

★★★★★

How to create the ultimate home theatre PC

It's all very well adding HTPC software to your existing computer, but there are several factors to consider if you want the best experience. Follow the steps below to create the ultimate home theatre setup incorporating hardware and software.

Step 1 **Box clever**

The first step is to select an appropriate enclosure for your PC. There are hundreds to choose from, but a great option is the Shuttle SD11G5 barebones PC. Like most of Shuttle's range, it is small and attractive, but it also has a couple of tricks up its sleeve – notably support for the Pentium M processors used in notebook computers.
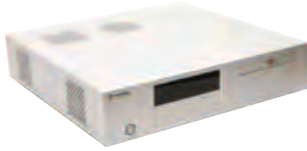
If you're feeling slightly more adventurous, you could try the Ahanix MCE302 from QuietPC (www.quietpc.com/uk). This ATX desktop case is designed to resemble an ordinary DVD or VHS player, and can also accept motherboards such as the Aopen i915GMm-HFS (www.aopen.com), which accepts Pentium M CPUs.

Step 2 **Reverse thrusters**

While many PC users will tell you that high performance is key, an HTPC needn't be as quick as your regular desktop computer. The Shuttle SD11G5 supports Pentium M CPUs running at up to 2.13GHz, but due to the relatively low software requirements of most HTPC software, you could try getting a much slower model. These generate less heat than their faster counterparts and require much slower-spinning (hence quieter) fans to cool them.
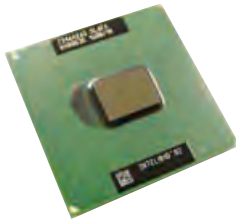
Step 3 **Quiet storm**

Now that you have the main components, you'll need to think about keeping the rest of the PC as quiet as possible. Hard drives are a major culprit, so cast aside your aspersions about slow spin speed and opt for as quiet a hard drive as possible, regardless of its quoted rpm. The 300GB Maxtor 6B300S0 is quick, but it's also quiet. If you've chosen the Ahanix MCE302 case or similar, you could go even further by sealing the hard drive in an acoustic enclosure, such as the Silentdrive from QuietPC (www.quietpc.com/uk). Due to space restrictions, the Silentdrive won't work with the Shuttle SD11G5.

Step 4 **Power down**

A power supply unit (PSU) is an essential part of any PC, but it can generate a substantial amount of noise. Shuttle PCs use external 'brick' PSUs that run silently, but there are several options for full-size ATX cases. You'll have to make sure your chosen case has sufficient airflow, but a fanless or 'semi-fanless' PSU such as the Silentmaxx Semi-fanless 450w is a great choice. This model has several operation modes, including 'Off' and 'Auto', that dictate how quickly (and noisily) the fan spins.

Step 5 **Tune up**

Next you'll need to install one or more TV tuners so your HTPC can receive television broadcasts. If you've chosen a case where internal space is at a premium, the Terratec Cinergy XS is ideal. It is a small USB device with both analogue and digital tuners. For the ultimate setup, you could try getting two dual TV tuners, which will let you record up to four channels simultaneously, or to record three programmes while you watch one.

Step 6 **Control freak**

Now your HTPC system is up and running, you'll want to control it. Forget an ordinary keyboard and mouse; why not opt for a wireless keyboard with an integrated mouse? The Microsoft Remote Keyboard (Windows XP Media Center Edition) is an infra-red model that lets you control the action from the comfort of your armchair. If you're feeling extravagant, we recommend you buy the official Windows XP MCE remote control (www.dabs.com) as this is compatible with most HTPC software.

Step 7 **Stream machines**

If you're planning to use your HTPC as a media hub, you could try streaming media directly from your HTPC to other PCs on your home network. Some HTPC applications support streaming, whereas others need add-ons. Check the table on the next page for the streaming compatibility of the products reviewed in this group test.

Home theatre software

MANUFACTURER	CYBERLINK	FREY TECHNOLOGIES	MEEDIO	MICROSOFT
Product	Powercinema 4 Digital Tuner Edition	SageTV 2.2	Meedio Pro	Windows XP Media Center Edition Update Rollup 2
Price inc VAT	£59.83	£45.61	£45.77	N/A
Telephone	None	None	+1 (1)877 633 3461 x701	N/A
URL	www.gocyberlink.com	www.freytechnologies.com	www.meedio.com	www.microsoft.com/mce
SPECIFICATIONS				
Timeshifting	✔	✔	✔	✔
Padding	✗	✔	✔	✔
Supported video formats	mpeg2	mpeg2, mpeg4, DivX	mpeg2	mpeg2, wmv
Multi-channel previewing	✔	✗	✗	✗
Commercial skipping	✗	✗	✗	✗
Recording conflict management	✔	✔	✔	✔
Burn to disc	✗	✗	✗	✔
Off-site recording control	✗	✔	✗	✗
PLAYBACK SPECS				
DVD playback/CD playback	✔/Via ripping	✔/✗	✔/✔	✔/✔
DVB-T/Analogue TV	✔/✔	✗/✔	✔/✔	✔/✔
EPG support (UK)	✔	✗	✗	✔
Picture in picture/DVB-T radio	✗/✔	✗/✗	✗/✗	✗/✔
Multi-tuner support	✔	✔	✔	✔
Streaming media server	✗	✔	✗	✔
SCORES				
Features	★★★★☆	★★★☆☆	★★★★☆	★★★★☆
Ease of use	★★★★★	★★☆☆☆	★★★☆☆	★★★★★
Value for money	★★★★☆	★★★☆☆	★★★☆☆	N/A
OVERALL	★★★★☆	★★★☆☆	★★★☆☆	★★★★★

MANUFACTURER	NERO	SOURCEFORGE	SHOWSHIFTER NETWORKS	SNAPSTREAM MEDIA
Product	Nero 7 Premium	Media Portal	Showshifter 3.12	BeyondTV
Price inc VAT	£47.94	Free	£29.99	£39.93
Telephone	None	None	None	+01 (0)713 644 6240
URL	www.nero.com	http://mediaportal.sourceforge.net	www.showshifter.com	www.snapstream.com
SPECIFICATIONS				
Timeshifting	✔	✔	✔	✔
Padding	✗	✔	✗	✔
Supported video formats	mpeg2, mpeg4	mpeg2, DivX, Xvid	mpeg2, mpeg4, DivX	mpeg2
Multi-channel previewing	✗	✗	✗	✗
Commercial skipping	✗	✗	✗	✔
Recording conflict management	✗	✗	✔	✔
Burn to disc	✗	Via add-on	✗	✗
Off-site recording control	✗	✗	✗	✔
PLAYBACK SPECS				
DVD playback/CD playback	✔/✗	✔/Via ripping	✔/✔	✗/✗
DVB-T/Analogue TV	✔/✔	✔/✔	✔/✔	✗/✔
EPG support (UK)	✗	✗	✔	✗
Picture in picture/DVB-T radio	✗/✗	✗/✔	✗/✔	✗/✗
Multi-tuner support	✗	✔	✗	✔
Streaming media server	✔	✗	✔	✗ (requires add-in)
SCORES				
Features	★★★★★	★★★☆☆	★★★★☆	★★★☆☆
Ease of use	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆
Value for money	★★★★★	★★★★★	★★★★★	★★★☆☆
OVERALL	★★★★☆	★★★★☆	★★★★★	★★★☆☆

Get your own programme guide

Not all HTPC software has full support for electronic programming guides (EPGs). However, most will allow you to import your own EPG data downloaded from the Internet. XMLTV, available from http://tinyurl.com/7ey74, is a set of utilities for managing your TV viewing. It stores TV listings in the XMLTV format, which is based on the Extensible Markup Language (XML) standard. To get XMLTV, take the following steps:

Step 1 Get XMLTV

Download the latest Windows binary. It should be named xmltv-x.x.xx-win32.zip, where x is a version number. Unzip this into a folder on your PC, such as c:\xmltv. Open a Dos command window by clicking Start / Run, then type
`cmd`
and press Return. Navigate to c:\xmltv (or wherever you unzipped the XMLTV binary) by typing
`cd c:\xmltv`

Step 2 Configure XMLTV

You'll then need to configure your channel package according to the XMLTV documentation. UK users should type
`xmltv.exe tv_grab_uk_rt —configure`
XMLTV will then list a selection of channels for your region, at which point you can specify whether to add each one to your list. Once completed, this process will generate a file called listings.xml.
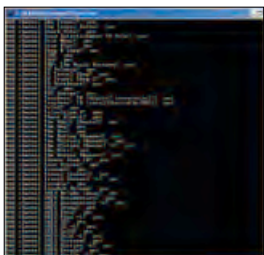
Step 3 Import your listings

Once you have the listings.xml file, import the file into your HTPC software. This is done in different ways depending on the individual software, so you'll need to consult the manual. In the case of Media Portal, rename listings.xml to tvguide.xml, run the Settings Wizard, navigate to the EPG guide settings page, and enter the path where tvguide.xml is stored (for example, c:\xmltv).

Step 4 Select TV guide

Finally, click the Scheduler tab, open the Grabber dropdown menu and select 'TVguide.xml File' before clicking the Run Grabber button.

You should now be able to watch TV complete with an electronic programming guide for the next two weeks. You can ask your EPG software to automatically update your listings file on a regular basis (daily if necessary). Again, you'll need to consult your HTPC manual for information on how to do this.
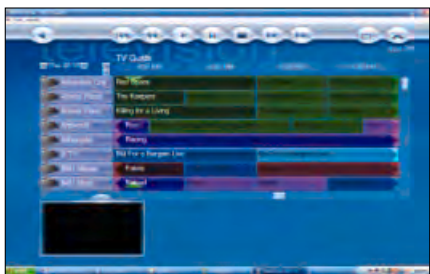
Editor's Choice

Editor's Choice **Microsoft Windows XP Media Center Edition Update Rollup 2**
Recommended **Showshifter 3.12 • Sourceforge Media Portal**

Creating your own HTPC is anything but straightforward. One of the main problems is that not all TV tuners are compatible with all the packages. While one application may support one particular set of tuners, there's no guarantee it will support yours. Our advice is to choose a popular or well-known brand of tuner or consult the support pages of your HTPC software to ensure it is compatible with your hardware.

Other important considerations include EPG support. Some packages have no support for EPGs, while others support subscription-based ones. Some require a third-party plug-in, such as XMLTV. This is fine if you're confident with PCs and TV tuners in particular, but less experienced users should consider an EPG subscription.

Our Editor's Choice award goes to Windows XP Media Center Edition Update Rollup 2, even though it isn't a standalone application. You'll have to buy a new PC to use it, but nothing rivals it for simplicity. Our only gripes were minor.
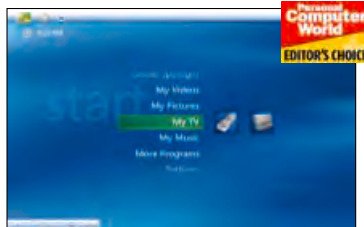
Windows XP Media Center Edition Update Rollup 2

Our first runner-up is Showshifter, which has long been a credible alternative to MCE. It is easy to set up and, although it has an icon-based user interface, it doesn't take long to figure out what each picture on the main menu represents.

The second Recommended award goes to the open-source Sourceforge Media Portal. It is the only free software here, but that doesn't mean it is any less capable than its counterparts. Its only significant flaw is a slightly unfriendly setup process, which may be a little too confusing for those without prior knowledge of TV tuner cards.

Once you get past this hurdle, it's hard to believe Media Portal is free. Its user interface is friendly – it does a great impression of MCE – and there's plenty of good functionality including DVD playback and multi-tuner support.

Whichever software you choose, setting up your own HTPC will improve your digital entertainment setup no end. **PCW**

Pick of the pic printers

Diminutive devices that output your photos at home are put under the spotlight by Luke Peters

The advent of compact photo printers has allowed digital camera owners to create a photo-developing lab in their own home. Rather than battling with high-street photo kiosks or emailing photos to an online service, today's compact photo printers allow you to produce 6 x 4in photos from a computer, CD, USB key, over Bluetooth or directly from a camera or memory card.

Two printing models are currently available. Inkjet printers use a traditional ink cartridge, which generally produces more vivid colours, but they take longer to print. Dye-sublimation printing uses a thermal transfer method to produce images. Aside from producing high-quality prints, dye-sublimation (dye-sub) prints are quicker to arrive and aren't susceptible to smudging.

We've looked at three of each and weighed up each model based on features, print speed, print quality and the price per print. The price per print is based on the cheapest paper/ink bundle we could find.

Canon Selphy CP710

Price £169 **Contact** www.canon.co.uk **Overall** ★★★★☆

The CP710 is the second most expensive device here. It has a USB connection for Pictbridge-compatible cameras and slots on the front for memory cards, so a PC isn't needed to generate prints.

There's also an LCD screen for previewing prints. If you do want to print from a computer, Canon has included a good, easy-to-use range of software for storing, stitching and printing photos.

The CP710 is one of the smallest printers here, but because it feeds paper out the back and through the front, you need around 19cm of free desk space in front of the device and 10cm behind. Each 6 x 4in print takes one minute, 13 seconds to appear and, because this is a dye-

sub printer, they're ready to handle immediately.

The 28p per print cost is one of the highest here, but print quality is extremely good and on a par with the Epson. Colours are exceptionally rich and vivid, which is quite unusual for dye-sub printing. There's also an excellent level of detail for printing close-up photos.

Dell Photo Printer 540

Price £111 **Contact** www.dell.co.uk **Overall** ★★☆☆☆

Dell's shot at the photo printer is a dye-sub model. It's one of the cheapest to buy but the most expensive to run, costing 32p per print. None of the printers here come with a USB cable so you'll have to factor that into the cost. The 540 is Pictbridge and memory card-compatible, and the large LCD screen displays clear images.

The printer allows for basic image tinkering without a computer, using simple menus. It will print an index showing all images on a card or camera. The LCD screen will tell you how many remaining prints are possible from the film cartridge installed. Trial versions of Paint Shop Pro and Paint Shop Photo album are included but expire after 30 days.

A printing time of one minute, two seconds per print is the fastest in this test. Once during testing, the feed took two sheets at a time. The second sheet could be re-used, but the photo had to be reprinted.

Photos had slight banding and some worrying image noise, and colour levels looked flat compared to results from the other printers.

Epson Picturemate 100

Price £100 **Contact** www.epson.co.uk **Overall** ★★★★★

Epson's Picturemate 100 supports Pictbridge and will accept most types of memory card, including XD Picture Card, which will please Fuji and Olympus camera owners.

The 100 has a carry handle and space for a rechargeable battery, which will cost £50 as an optional extra. The LCD screen is sharp and there are various options for printing an index, doubles, or with or without a border. The printer also comes with a decent collection of setup material and a reference sticker, which identifies what each button does. In short, it's a great product for those new to home photo printing.

The ink cartridge uses a four-colour high-gloss ink, which prints at an enhanced resolution of 5,760dpi on suitable media using Epson's Resolution Performance Management.

At one minute, 30 seconds each, the Picturemate takes longer to produce images than the dye-sub models, but the cost per print works out at just 22p. Colours are rich and the inkjet gloss gives photos an extra touch of class.

Personal Computer World EDITOR'S CHOICE

HP Photosmart 475

Price £200 **Contact** www.hp.com/uk **Overall** ★★★★☆

It's twice as expensive as Epson's offering, but packed with features. As well as support for most memory card types, there is an integrated 1.5GB hard disk for storing photos. This means images can be stored on and printed from the printer. There's a TV-out socket and remote control for viewing and printing images using a TV screen as the display.

A USB Bluetooth dongle, which will cost you another £30, allows for wireless printing. The battery pack, another extra that will cost £50, tucks in underneath the printer for portable printing.

The 475 was slow compared to the others at one minute, 40 seconds per print, but just 20p per print is very cheap.

Standard ink cartridges are used. The tri-colour can be swapped out for a greyscale one, which produces better results for black and white photos. The colour prints were as rich as results from the Canon and Epson printers, but lacked the same definition. We noticed slight speckling on skin tones and small text wasn't as easy to decipher.

Lexmark P450

Price £150 **Contact** www.lexmark.co.uk **Overall** ★★★☆☆

This is the only printer here that can't connect directly to a computer, but it's also the only one with a CD writer. You can print via a USB key, CD, Pictbridge camera and six types of memory card and Bluetooth (with an appropriate adapter). The printer is bulky, but it doesn't take up too much desk space. The large LCD screen is good quality and lets you preview any of the built-in effects, such as red-eye removal.

Another useful feature is the ability to archive digital photos from a memory card, straight to the CD-writer. Everything is clearly labelled and easy to navigate.

Printing is slow, taking two minutes, 40 seconds to produce a 6 x 4in photo from a memory card – almost three times that of the Dell. The printing cost of 29p per photo is a bit more expensive compared to the others. As with the other inkjet models, you might waste ink if one colour runs out before the rest.

Print quality was the worst here, with noisy images and flat colours. This is a shame as the printer has some interesting features.
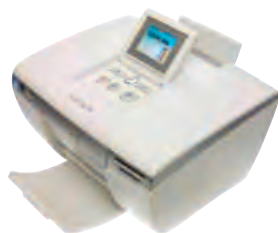
Sony DPP-FP50

Price £120 **Contact** www.sony.co.uk **Overall** ★★★☆☆

The DPP-FP50 has an unusual square design and, like the Dell and Canon devices, paper is fed out of the back and into the paper tray at the front, so you need space behind and in front of the unit.

It prints via Pictbridge and most memory card types (bar XD Picture Card). There's no preview display, only a small LCD screen showing menus and the print status. To view pictures from a memory card without a computer, the DPP-FP50 must be connected to a television. Once connected it offers a basic range of editing features such as red-eye removal and adding text to photos.

Print speed comes in at one minute, nine seconds per print, which is one of the quickest here. The printing costs are also cheap at just 23p per print.

Print quality was reasonable but nothing to shout about. As it's a dye-sub model there isn't the same sort of colour depth as the inkjet models, but the detail level is good.

In short, the DPP-FP50 is very much a middle-of-the-road printer.
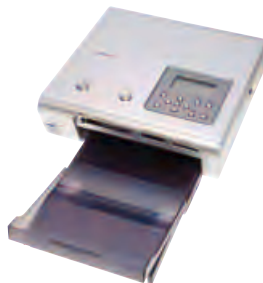
Compact photo printers

MANUFACTURER	CANON	DELL	EPSON
Model name	Selphy CP710	Photo Printer 540	Picturemate 100
Price inc VAT	£169	£111	£100
Sales telephone	0870 514 3723	0870 907 5818	0800 220 546
URL	www.canon.co.uk	www.dell.co.uk	www.epson.co.uk
SPECIFICATIONS			
Printing method	Dye-sub	Dye-sub	Inkjet
Connectivity	USB, Pictbridge	USB, Pictbridge	USB, Pictbridge
Paper sizes (inches)	6 x 4	6 x 4	6 x 4
Memory card slots	Compact Flash, Microdrive, MMC SD, Memory Stick	Compact Flash, Smart Media, MMC, SD, Memory Stick	Compact Flash, XD Picture Card, Smart Media, SD, MMC, Memory Stick, Microdrive
Print speed per 6 x 4in page (minutes:seconds)	1:13	1:02	1:30
Ink cost	£9.99 for 36 photo/ink pack	£37.99 for 120 photo/ink pack	£28.99 for 135 photo/ink pack
Lowest cost per 6 x 4in page	28p	32p	22p
Size (w x d x h) mm	178 x 131 x 63	191 x 137 x 82	256 x 305 x 167
Weight (kg)	1	1.64	2.7
SCORES			
Features	★★★★☆	★★☆☆☆	★★★☆☆
Performance	★★★★★	★★★☆☆	★★★★☆
Value for money	★★★☆☆	★★☆☆☆	★★★★★
OVERALL	★★★★☆	★★☆☆☆	★★★★★

MANUFACTURER	HP	LEXMARK	SONY
Model name	Photosmart 475	P450	DPP-FP50
Price inc VAT	£200	£150	£120
Sales telephone	0870 270 4222	0870 444 0044	0870 511 1999
URL	www.hp.com/uk	www.lexmark.co.uk	www.sony.co.uk
SPECIFICATIONS			
Printing method	Inkjet	Inkjet	Dye-sub
Connectivity	USB, Pictbridge, TV-out	USB, Pictbridge, CD	USB, Pictbridge, TV-out
Paper sizes (in)	6 x 4	6 x 4	6 x 4
Memory card slots	Memory Stick, Compact Flash, SD/MMC, XD Picture Card, 1.5GB onboard memory	Compact Flash, Smart Media, Memory Stick, SD, MMC, XD Picture Card	Compact Flash, SD, Memory Stick
Print speed per 6 x 4in page (minutes:seconds)	1:40	2:40	1:09
Ink cost	£20 for 100 photo/ink pack	£27.90 for 140 photo/ink pack	£27 for 120 photo/ink pack
Lowest cost per 6 x 4in page	20p	20p	23p
Size (w x d x h) mm	250 x 114 x 123	276 x 235 x 153	182 x 210 x 67
Weight (kg)	1.5	2.95	1.2
SCORES			
Features	★★★★☆	★★★★★	★★★☆☆
Performance	★★★★☆	★★☆☆☆	★★★☆☆
Value for money	★★★★☆	★★☆☆☆	★★★☆☆
OVERALL	★★★★☆	★★★☆☆	★★★☆☆

Editor's Choice

Editor's Choice Epson Picturemate 100

Your choice of compact photo printer will largely depend on what you need it for. The HP and Lexmark devices both come with some technology we haven't seen before – a built-in hard disk and CD writer respectively. We expect to see similar models appearing from their competitors.

The fact is that most people will only be concerned about two things – print quality and the overall cost of printing. The Lexmark may be one of the cheapest, but the photo quality is very disappointing. The Canon model leads the way in terms of photo quality but prints cost 8p more than the HP, which is itself a good all-rounder.

For the best of both worlds, Epson's device is the one to plump for. The print quality really shines, it costs just 22p per print and the unit is the cheapest here at £100. The Canon and HP come a close second but it is the Epson Picturemate 100 that gets our vote. **PCW**

The price of prints

Compact photo printers are unquestionably useful, but churn out enough prints and it soon starts to get expensive. As we've found out, the price per print varies from model to model and can range from 20p to 32p. The advantage of dye-sub printing is that you know exactly how many prints you will get for your money. Inkjet printing can vary depending on the amount and type of colour used for each photo.

Of course, there are other ways of getting real-life photographs from digital snaps aside from compact photo printers. Online services such as Photobox (www.photobox.co.uk) can get as low as 7p per print but you have no say over the type of printing used and you have to wait for delivery (see our group test of online photo services in *PCW* September 2005). High-street kiosks are instant and generally cheaper than home printing but, again, they can't match the convenience.

Personal Computer World

vnu labs

How we test

Performance testing is an important part of PCW's reviewing process and to obtain our authoritative results we use the UK's best PC testing resource – VNU Labs. Here we explain why you can trust our results and give you a tour of our most frequently used benchmark programs.

One of the main reasons people upgrade their PCs is because their old model seems 'too slow'. But how do you tell whether the one you're going to replace it with is any faster? At *PCW* we take PC testing very seriously and we have the UK's best PC testing labs – VNU Labs – on tap to help us give you reliable, authoritative performance figures, to help you with your purchasing decisions.

It's true that speed isn't everything, but it's an important part of the buying equation, especially when there are so many components out there. As many of our PC group tests are based on price bands, checking the performance is even more important – if the core system is underperforming, you need to know before you part with your hard-earned cash.

In VNU's UK Labs, which is part of the European VNU Labs network, our staff have over 20 years of combined testing experience. We know all the perils and pitfalls of practical benchmarking and we contribute to the development of industry-standard benchmarks through our full membership of Bapco (www.bapco.com), the non-profit benchmark consortium. We are also a media member of the Futuremark Benchmark Development Program (www.futuremark.com). Listed below are the main benchmarks we use for testing PC systems and components.
• Bapco Sysmark 2004 SE – an application-based benchmark that tests real-world system performance.
• Futuremark 3Dmark03 – a 3D graphics benchmark designed to test the performance of DirectX 8 graphics cards.
• Futuremark 3Dmark05 – the latest version of 3Dmark that tests DirectX 9 3D graphics performance.
• Ubisoft Far Cry – we use the Fort level timedemo to see how graphics cards perform in a real DirectX 9 game.
• Futuremark PCmark05 – a synthetic benchmark used to test the performance of a PC's major subsystems.
• Bapco Mobilemark 2005 – used to assess the battery life of notebooks using real-world applications and usage scenarios.
• Test beds – we use standardised AMD and Intel-based test rigs to test components and peripherals.

There's more information about our testing procedures and benchmarks on our Labs site at www.reportlabs.com/testbed/bguides/benchmarks.php.

PCmark04 measures memory, processor, graphics and hard drive performance
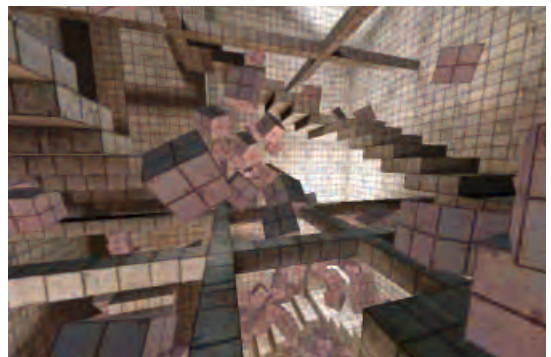
3Dmark03 is used to test DirectX 7/8 graphics cards

3Dmark05 pushes modern graphics cards to their limits
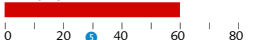
Performance

Sysmark 2004 SE: 200 ❶

```
0        100 ❷    200        300
```

3Dmark05* PNY Geforce 7800 GTX: 7,490 ❸

```
0    2,000   4,000   6,000   8,000
```
* tested at 1,024x768 in 32bit colour

Far Cry (fps): 60 ❹

```
0      20   ❺   40      60      80
```

❶ A score of 200 indicates that the system is twice as fast as the reference PC
❷ The reference PC (2GHz P4 512MB of Ram) scores 100
❸ A Geforce 7800 GTX would score in the region of 7,490
❹ A score of 60fps (frames per second) or higher is most desirable
❺ A result of 30fps or above means the machine can produce playable frame rates at the tested resolution

Safe as houses

Malware programs are finding new ways to sneak round firewalls, virus scanners and system tools to cause havoc on your PC. Jörg Geiger explains how this is done and provides some effective counter-measures so you can ensure your system is watertight

In theory Windows computers should be as secure as the Bank of England. Firewalls have never been as effective, virus scanners have never been so capable and spyware scanners have never been as widespread as they are today. The major proviso is that your security software has to be properly configured. Microsoft's Service Pack 2 for Windows XP introduced the Security Center, which reassured users that it was looking after their data and computers with automatic virus scanning and Updates. Unfortunately, this is misleading: in practice, Windows is like a crumbling building with cracks appearing all the time.

Malware finds new entry points

Research by the Computing Technology Industry Association (www.comptia.org) has shown that new threats adjust themselves according to the security measures in use. They simply look for new loopholes and weak points in the system. For example, targeted browser attacks increased by nearly 60 per cent in 2004 and 'phishing' attacks by about a quarter. Malware doesn't try to crudely break through firewalls any more, but uses more refined methods of attacking your PC. These include 'rootkits' that malware uses to sniff out loopholes. These rootkits are smuggled in through cracks in Windows or by unmonitored downloads. Mikko Hyppönnen, chief research officer at Finnish company F-Secure, thinks powerful Windows rootkits could develop into a real problem. 'Rootkit programs gain access to all the data on a system and could cause chaos unnoticed,' he said. We'll explain later how these attackers behave and how you can protect yourself.

It's almost unbelievable that Microsoft's preferred file system, NTFS, allows files of any size to be hidden using a little-known compatibility feature, Alternate Data Streams (ADSs), without leaving any traces. These data streams are also used in Vista, Microsoft's forthcoming operating system, which is based on NTFS. With a few exceptions, virus and spyware scanners will also ignore these hidden files. Later in this feature, there's information on tools you need to track down these files and step-by-step instructions on how to use them.

At your own risk!

In this feature, we'll point out some of the back doors in Windows XP. However, you should be aware that experimenting with rootkits and the debugging tools can lead to stability problems. If you are going to experiment, it's best to use either a virtual machine (using Microsoft's Virtual PC trial version, for example) or a computer on which no important data is stored. You have been warned.

FIG 1

	Program
	Windows system DLLs
User mode	NTdll.dll
Kernel mode	System calls
	File system driver
Hard drive subsystem	

Windows API

Native API

System call interface

FIlter driver

Raw data

SCREEN 1

The Windows API is made up of layers – a fact that is often exploited by rootkits – and different search tools are needed for each hiding place

Hacker Defender hides all files with the character sequence hxdef in their names

Cracks in Windows uncovered

Windows XP has more surprises: hidden user accounts, invisible file shares, readable password databases and hidden Registry keys are just the tip of the iceberg. For some hints on how you can plug those Windows security holes see page 115.

DANGEROUS ROOTKITS

Just when you think you've secured your PC using a virus scanner and a firewall, a new threat emerges. Using sophisticated techniques, rootkits burrow themselves into Windows and hide various malware programs. They not only deceive system tools, but also trick virus scanners and anti-spyware programs: they're parasites that are almost invisible to Windows.

In themselves, rootkits are not forbidden or particularly harmful. They simply allow processes, services, directories, TCP/IP ports, files, Registry entries or drivers to be hidden within the operating system. The catch is that malware can use this method too. There are already some viruses, such as Maslan or Padodor, which use rootkits to hide themselves. Since they camouflage themselves so well, this sort of threat is often referred to as a stealth virus.

Until now, the amount of malware using rootkits for disguise has been kept down to a reasonable level, although the source code for creating them is freely available. Some kits, for example, are available at www.rootkit.com including Hacker Defender and NT Rootkit. Information about the capabilities of programs like these can make a real difference to limiting the growing threat malware poses to a wider public.

Misdirected communication

The first rootkits for Unix were quite primitive in construction (see box below, 'The invisible threat') and no longer pose a challenge for up-to-date virus scanners. However, the new rootkits, which clearly have Windows in their sights, can hide malware in the system with alarming efficiency. They do this by applying leverage to the Windows APIs (application programming interfaces) which supply applications with information. The rootkits then, unnoticed, manipulate the communication between the system components, hide themselves and camouflage malware.

In order to do this, intelligent rootkits embed themselves at various places in the system. Windows can be divided, roughly speaking, into a user mode and a kernel mode (see figure 1). Applications such as your web browser or office suite run in user mode, whereas things that are internal to the system, such as the file system filter drivers, use kernel mode. Windows uses a layered model. The top layer is made up of
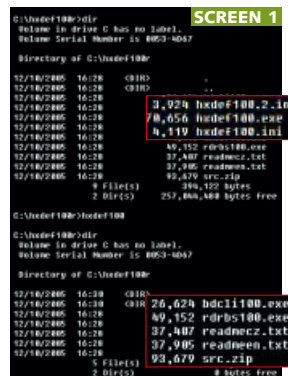
application programs and below that lies the Windows API, which is in turn supported by the system libraries (Dynamic Link Libraries, DLLs). Windows inserts a couple of intermediate layers before access to the raw data on the hard disk is possible. Communication within the system works best from one layer to the layer immediately above or below it in the hierarchy.

In a similar way to Windows modes, rootkits can also be divided into user mode and kernel mode varieties. Both types manipulate the system components' communications; kernel mode rootkits are more dangerous because they are more difficult to uncover. Kernel mode rootkits only work if you are logged in as an administrator, which is unfortunately the default case for most Windows XP users.

The greatest challenge when finding and uncovering rootkits is that the required tools must be able to access various layers within Windows. If a rootkit's manipulating a layer, then any scanner which relies on that layer or one above it becomes useless.

The invisible threat

Rootkits are not a new discovery. The first rootkits for Unix systems emerged at the start of the 1990s, when shell commands were replaced with manipulated versions such as the frequently used command ps, with which all active processes can be listed. As tools altered like this were discovered by Unix root-level administrators they became known as rootkits.

If a Unix administrator typed the command ps into the shell, the rootkit only showed some of the active processes – the

malware processes were hidden. The rootkit used the same method to falsify the directory listing produced with the ls command. As a result, the ls command, comparable with dir under Windows, no longer displayed all files. The rootkit filtered the operating system's view and hid malware files.

Rootkits first caused a furore in the world of Windows in the late 1990s when the Code Red worm buried itself successfully in Microsoft's Internet Information Server. Experts think that rootkits are a time bomb.

SCREEN 2
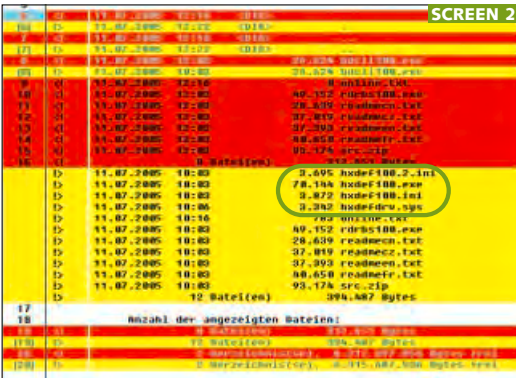
Windiff compares two directory scans – the four files circled in green are hidden by a rootkit

SCREEN 3
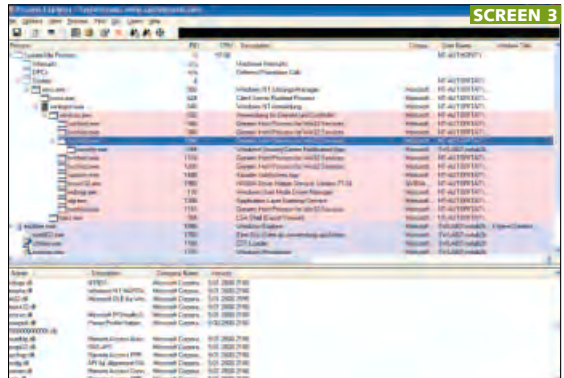
The free Process Explorer utility shows more information than the Windows Task Manager and is not as easy to trick

Hide and seek under Windows

A favourite way for rootkits to hide a process is called a 'man-in-the-middle-attack'. The rootkit buries itself between the Task Manager and the Windows API. The Task Manager calls a Windows API in order to get a list of currently active processes. However, the rootkit intercepts the Task Manager's request to the API before passing it on. The rootkit also intercepts the API's reply and removes itself from the list of active processes (API filtering) before relaying the answer to the Task Manager. So the Task Manager doesn't show the rootkit process, although it is running. If the rootkit's being used to hide an attacker, not only are all references to the rootkit removed from the list, but all pointers to the running malware components are removed too.

This deceptive manoeuvre works with all programs that make their requests using the Windows API. The most obvious example is Windows Explorer. You can easily demonstrate how quickly files can be hidden before they're shown in Explorer, by using Hacker Defender, one of the User mode rootkits. It consists of an exe file and an ini file which acts as a configuration file. The exe file can be easily started with a double-click; it then processes the contents of the ini file.

Using its default settings, Hacker Defender hides all files with the character string 'hxdef' in their names (see screen 1). This will trick Explorer or the command-line 'dir' command – Hacker Defender hides itself. If you want to disguise other programs using Hacker Defender, then all you have to do is alter the relevant settings in the ini file.

Finding Hacker Defender

Files can be easily hidden using Hacker Defender. However, as they are not really invisible and it's easy to uncover them again. The trick is not to call the Windows API but to make use of a layer that lies deeper in the operating system. This means that by using

some system tools and free extra software it only takes a few steps to find out which files are really lurking on your system. The idea is that, while operating normally, you make an inventory list of all files on the system and save it as an online snapshot. You then boot from an external medium using a bootable live Windows CD such as Bart PE (www.nu2.nu/pebuilder) and create another inventory list (an offline snapshot). You then use the Windows command-line command windiff to compare the online and offline snapshots. Any differences reveal that files are being hidden by a rootkit (see screen 2). If you want to perform a comparison, follow the three steps below.

STEP 1 Choose Start/Run and enter the command cmd to get a Windows command prompt. Change either to the directory where you suspect a rootkit to be, or change to drive C:\. Enter dir/s/a > c:\online.txt to save an online snapshot to the file online.txt.

STEP 2 Choose an external boot medium. We recommend Bart PE, because it works best with NTFS drives. Start your computer using the Bart PE CD and once again open a command prompt. Use the command dir/s/a > c:\offline.txt to make an offline snapshot.

STEP 3 Compare the two lists by using the windiff command. Run the command 'windiff

c:\online.txt c:\off-line.txt' and the utility will present you with an overview of the differences between the two files. Two files hidden by Hacker Defender – hxdef100.exe and hxdef100.ini – stand out. Windiff is a component of the Windows Support Tools (http://tinyurl.com/2zr2z) which can also be found on the Service Pack 2 CD. If you only want windiff then you can download it separately from www.grigsoft.com/download-windiff.htm.

Finding hidden processes

The online-offline method described only works for hidden objects which are accessible in both modes. Although files can be found, hidden processes remain hidden as they don't run if you boot the computer from an external 'clean' live Windows CD. Help comes in the form of the free tool Process Explorer (www.sysinternals.com) which is so useful that it ought to be added to every XP PC (see screen 3). It bypasses the Windows API and can't be fooled by Hacker Defender. The utility displays in detail which programs have loaded which DLLs and Handles (pointers to data objects). However, Process Explorer does have its limits, and more and more rootkits are making attempts to fool the program. Hacker Defender, for example, is only found if you do an explicit search for handles.

Microsoft and rootkits

It must be serious – even Microsoft is developing a rootkit finder. At http://research.microsoft.com/rootkit there is already some information about Strider Ghostbuster, Microsoft's rootkit detection utility. When and how (perhaps as a part of Antispyware) Microsoft plans to release the program is not yet known. At present, the web pages referred to just contain downloadable information on rootkits and API filtering.

The rootkit finder Strider Ghostbuster is still some way off

Finding kernel mode rootkits

Kernel mode rootkits, the group to which things such as NT Rootkit belong, work in a similar way to their user mode counterparts. The system calls are redirected using modified pointers to the rootkit – and, in the same way, the rootkit intercepts the replies from lower-lying operating system layers. To ensure the rootkit's survival in user mode, it's disguised as a device driver. Kernel mode rootkits can, however, not only manipulate system calls but also modify kernel modules directly. For example, the rootkit known as FU can delete processes from the kernel's active process list. FU can't be found using Process Explorer.

Rootkit with virus scanner methods

NT Rootkit hides itself in a very refined manner. The program installs itself as a filter driver between the API and the file system and therefore knows about all file operations. It doesn't matter whether a system call is made via the API or bypassing it: the filter driver can influence the communication. Curiously, filter drivers are also used by virus scanners to search out pests.

Intelligent rootkits such as NT Rootkit can only be tracked down with heavy-duty developer tools such as Microsoft's Windows

'The problem with rootkits is you can never be sure you have found them all'

Kernel Debugger. You can download separate versions for x86 and x64 systems for free from www.microsoft.com/whdc/ddk/debugging. Rootkits that don't manipulate the kernel directly can be found by using the Debugger, but it's not recommended for novices.

The problem with the struggle against rootkits is you can never be sure whether you have found them all and that your scanner tool's output has not been tampered with. As a result, you need to supplement your virus and spyware scanners with as many analysis tools as possible.

Specialist anti-rootkit tools

The market is reacting to the new threat, so there are already tools available that specialise in sniffing out rootkits. F-Secure's Blacklight, for example, is still in beta but the company plans to integrate it with the F-Secure virus scanner.

Another search tool is Rootkit Revealer (www.sysinternals.com/utilities/rootkit

revealer.html) from Sysinternals. It recognises rootkits that use API filtering and can therefore be used as a replacement for the online-offline method described above. It's easy to use: a single scan checks the whole system for rootkits, although it's important to note that Rootkit Revealer doesn't remove any rootkits it discovers (see screen 4). If you are certain you have detected one or more rootkits, you will have to remove the corresponding files and Registry keys manually.

Little protection from rootkits

Rootkits present a completely new danger, but the situation isn't hopeless. Each of the rootkit types described here has its weaknesses and can be detected using the right tools. The bad news is that if you do find a rootkit on your system, you'll probably need to reformat the hard disk and reinstall Windows as there's no guarantee that all the hidden nasties have been found. The best strategy is not to let your computer get infected in the first place. You need to take several steps to accomplish this:
● Install a firewall between your computer or network and the Internet. If you are on a budget, a DSL router with an integrated packet filter will do. Computers on an

Specialist utilities such as Rootkit Revealer test for the presence of rootkits that try to manipulate the API

Intranet should also be protected by desktop firewalls.

● Configure your browser and email client securely. For example, turn off Internet Explorer's Active Scripting and turn off Javascript on Firefox.

● Only log in as an administrator to perform system maintenance and use a limited/restricted account for other tasks.

● Enable Windows automatic updates in order to keep your operating system and applications up to date.

● Customise the service configuration; set up Windows services to match what the computer is being used for.

● Install, use and update a virus scanner.

● Install, use and update a spyware scanner.

● Make backups of your important data at regular intervals.

● Make use of the utilities discussed here to keep an eye on your Windows XP system.

Further information
Controversial website on the subject
www.rootkit.com
Rootkit detection from Microsoft
http://research.microsoft.com/rootkit

TRACK HIDDEN OBJECTS
Since the beginning of the 1990s it has been possible to hide files in Windows operating systems in such a way that it's almost impossible to find them. These hidden files are not displayed by Explorer and they can't be found or removed by other Windows or command-line tools. It gets worse: even some security utilities miss or ignore these hidden files. Programs to verify the checksums are easily fooled and some virus scanners neglect the hidden code,

which can also be damaging. As we said earlier, the odd thing is that Microsoft built the ADS into NTFS.

Deceptive NTFS functions
Under NTFS a file consists of multiple data streams. The main data stream contains the usable data, that is the actual content of the file. In a Word document, it's the text; in an exe file, it's the executable program code. ADS information stores supplementary details about the file, such as its security settings, a preview in the case of pictures or pointers to other files. In theory, there's no limit on the number of data streams per file.

To give a practical example: when downloading a file, Internet Explorer uses

'Huge files that fill up the hard disk can be hidden in the ADS'

ADS to generate a Zone ID. If you open a file that is tagged like this after downloading, you will see a reminder that it's a file from the Internet – Windows has evaluated the ADS (see screen 5).

A big advantage of ADS is that it can keep details of access rights separate from the content. However, there are also two drawbacks. On the one hand, all types of data can be stored in ADS including executable files. Second, Windows doesn't provide a tool to find ADS. A further complication is that the size of the data and the files in the ADS need not bear any relationship to one another. A 10byte file might have a 4GB ADS, and Windows will still show a file size of 10bytes. This makes an ADS the ideal place to hide things.

To create an ADS, you do not need administrator privileges, just write permission for a file. ADS only works on NTFS – if you copy a file or directory with an associated ADS to a Fat32 partition, the ADSs will be lost (see screen 6).

DIY ADS
An ADS can be created very easily, for example using the Windows editor Notepad. Choose Start/Run and enter the command 'notepad test.txt'. This creates a new text file named test.txt. Enter some text, save the file and close Notepad. Start Explorer and select test.txt and have a Look at the file size via the context menu – just 17bytes under Windows XP. Next, open a command window and change to the

Are checksums the answer?

If you often download programs from the Internet you'll be aware of the value of checksums. The program authors use them to sign their work with a sort of digital fingerprint. By comparing the original checksum to the downloaded one, it's easy for a user to check whether or not they've downloaded the original file. The checksum also acts as a protection against running a file which has been illicitly modified.

We used md5sum and cksum (http://unxutils.sourceforge.net), to test whether or not checksum calculators could recognise ADSs.

Without ADSs we got the following checksums:

md5sum test.txt
dc15d819d604ceb6f8211f3ab35b2f85
cksum test.txt: 36716247 45

We then added the Windows calculator to an ADS using the following command:

type c:\windows\system32\calc.exe > test.txt:calc.exe

We then re-ran the checksum tests with the following result:

md5sum test.txt dc15d819d604ceb6f8211f3ab35b2f85
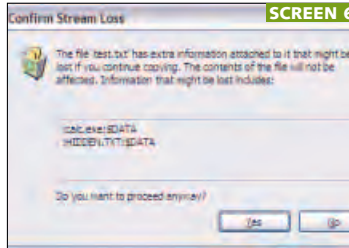**cksum test.txt: 36716247 45**

This shows that the checksums only take the main data stream into consideration and that ADS remain unrecognised, so they're of little use against clever malware.

Windows saves the warning about running exe files from the Internet in an ADS

When copying NTFS files to Fat32 partition using ADS the alternative streams go missing

directory where test.txt is located and enter the command dir test.txt which will confirm the 17byte file size that Explorer also reported. Next, choose Start/Run and enter the command notepad test.txt:hidden.txt and enter some text, for example 'This is a test with hidden content' and save the file. You must save this new file in the same directory where you saved the original test.txt. Now close Notepad.

As shown in the example, you can use Notepad to display and change the ADS associated with a file, but this only works if you know the stream's name. Turning it round, this means if you do not know the ADS' name, you have no chance of finding it with Windows' own tools.

The second file you created with Notepad is an ADS containing the new text. Check the test.txt file using both Explorer and the dir command. As before, both show a size of 17bytes. If you open

test.txt using Windows Explorer you will only see the original text displayed. There is no sign of the ADS – Windows search will not expose it either. However, if you use the command prompt and enter notepad test.txt:hidden.txt the content of the ADS is displayed. This proves that Explorer and dir only display the contents of the main data stream.

Attacking Windows using ADS

An ADS can hold data in any form. This means that a descriptive text, a secret message, a picture or an executable file can be hidden there. It's dangerous if the ADS contains an executable file which can be started automatically by a Registry entry. In our tests, we used the command type to hide an exe file in test.txt's ADS.

The exact command is type filename.exe > test.txt:filename.exes. The executable file can be run from the ADS using the command 'start .\test.txt:filename.exe'. For testing you could use one of the accessory files that comes with Windows, such as Notepad or the Calculator to embed in the ADS using a text file and run with the Start command. Executable stream contents can be started by a Registry entry or by a VB Script as well as manually as just described.

Starting hidden DoS attacks

Denial of Service (DoS) attacks usually hit servers from the Internet. In such an attack a vast number of client requests hit a server, which becomes overloaded and collapses. Another type of DoS attack can be carried out using ADSs. Huge files that fill up the hard disk can be hidden in the ADS. As a result, the computer becomes unstable

SCREEN 7

The freeware tool Lads finds invisible data

because it has run out of hard disk space, and the user is unaware why as Windows can't see the ADS.

The main problem with ADSs is that Windows and its built-in tools can't see them. If you know the name of the hidden file, you can view it using Notepad. To find out how virus scanners react to ADSs, we prepared five files with ADSs and hid them on a Windows system. One stream contained a harmless piece of text and the other four had viruses in attachments. Two were attached as zip files, one was disguised as a text file and another nasty had a .com ending.

We used six leading virus scanners to search for the ADSs. The tests checked the scanners' on-demand functions after both

'Out of six virus scanners, only two detected and got rid of viruses in the ADS'

standard and custom installs. To exclude the possibility of errors, we also copied the viruses on the hard disk as normal files. In a best-case scenario the scanners ought to find eight viruses on the system: four on the normal system and four hidden in ADSs.

The results were disappointing: out of the six virus scanners tested, only McAfee and Kaspersky detected and got rid of all the viruses hidden in the ADSs. PC-Cillin also scanned the ADSs, by changing the Registry

entry TrapHiddenDataStream to 1. But it only found one of the four contaminated streams. Norton, Bit Defender and Panda ignored ADS completely. In their favour, at least they sprang into action when the malware file was started from a script.

Spyware scanners can't cope either

ADSs are also ideal as hiding places for spyware. We tested three freeware spyware detectors: Ad-aware (www.lavasoft.com), Spybot Search & Destroy (http://security.kolla.de) and Microsoft Antispyware Beta 1 (www.microsoft.com/athome/security/spyware/software/default.mspx).

We placed copies of the well-known spyware program Cydoor on the hard disk and then hidden in a text file's ADS. Microsoft's offering ignored the ADS as did Spybot. Ad-aware found nothing in standard mode but we could turn on an ADS scan and discover the hidden menace (see table 'ADS awareness of virus and adware scanners').

Freeware ADS detection tools

You can find out whether there are ADSs on your system with some freeware tools. List Alternate Data Streams 4 (Lads) (www.heysoft.de/Frames/f_sw_la_en.htm) lists ADSs together with their names and

sizes (see screen 7). Lads is a command-line tool. To use it, open a command prompt by choosing Start/Run and entering cmd. Change to the directory where you unpacked LadsG. The full syntax for the command is: lads [Directory] [/S][/D][/A][/Xname]. All parameters in square brackets are optional. If you don't specify a directory, then Lads scans the current folder. The /S switch scans subdirectories, /D is for Lads debugging and /A outputs a calculation of the space used by ADSs. You can use /Xname to exclude known ADSs of your choice from the scan.

An innovative new feature is that it's possible to pass complex instructions or queries to Lads in a text file. This is done using the /P switch. For example, lads /Pfile.txt runs the program using the parameters stored in file.txt. Lads reliably displays all ADSs. Freeware alternatives include Streams (www.sysinternals.com) and Crucial ADS (www.crucialsecurity.com), the only tool to use a graphical interface.

CLOSING BACK DOORS

Even years of experience with Windows is no guarantee that you won't find some nasty surprise in Microsoft's operating system. In this section we'll outline the most important back doors and explain how you can close them securely.

Hidden Admin shares

Shared drives for exchanging data over a network are a fact of life. However, you ought always to know which data you are allowing external access to. Shared folders under Windows can be displayed easily by entering net view at the command prompt. The catch is that this doesn't necessarily show all shares.
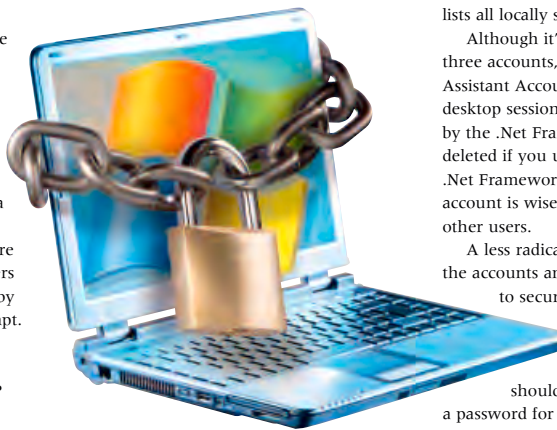
Windows XP Professional – unlike XP Home – recognises hidden shares. For example the system folder (%Systemroot%) is shared under the name ADMIN$. All hidden shares end with a dollar symbol, which can be used to hide normal shares. You can also see hidden shares via the Control Panel (Administrative Tools/ Computer Management/Shared Folders/ Shares). You can view this information from the command prompt, too, by using the command 'net share'.

Administrator shares are easy to turn off. A simple 'net share [sharename]/DELETE' command gets rid of them. If you don't like using the command line, you can delete the share using the Computer Management section of the Control Panel's Administrative Tools. However, this will only work if simple file sharing is turned off. To do this, in Windows Explorer choose Tools/Folder options/View/Use simple folder sharing.

You can use Syskey to further secure the Windows XP password database

But take care: the next time the computer is restarted, the shares will be there again, or rather all the default administrative shares created by Windows – those you added yourself will be gone for good. We recommend you turn off all shares except IPC$, which is also used for local process communication. If IPC$ is no longer present, installed programs may produce unexpected errors. And obviously, if you want to share folders over your local network, shares shouldn't be turned off.
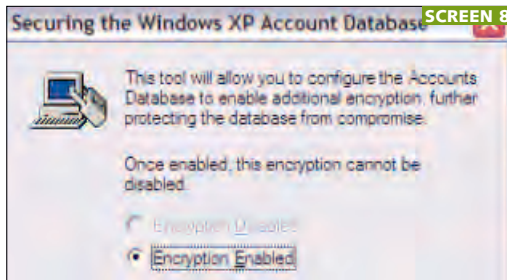
Admin shares can be turned off permanently. To do this use regedit and add a new DWORD entry called AutoShareWks with a value of 0 to the Registry's HKEY_LOCAL_MACHINE\ SYSTEM\CurrentControlSet\Services\ LanmanServer\ Parameters branch. This removes all the administrative shares as far as IPC$. To restore the shares delete the entry and restart the computer. If you do not need any file or printer shares than just turn off the Server service completely in the Services console (Start/Run/services/msc) – but again, don't do this if you want to share data over your network. The advantage is that the shares don't then reappear as if by magic when the computer is restarted.

Hidden user accounts

Security-conscious users should use a restricted user account, rather than an administrator account for their day-to-day work on the computer. As well as the user accounts you set up yourself, XP sneaks its own accounts into the system. These hidden accounts aren't obvious and can be

SCREEN 8

Securing the Windows XP Account Database

This tool will allow you to configure the Accounts Database to enable additional encryption, further protecting the database from compromise.

Once enabled, this encryption cannot be disabled.

○ Encryption Disabled
● Encryption Enabled

a potential security risk if you don't secure them properly.

You won't be much wiser if you look at the Control Panel's User Accounts section. At least you will see that, as well as your accounts created during installation, there is also an Administrator account and a Guest account. The System\Local Users and Groups option from the Control Panel's Computer Management section will normally list at least three further users: ASPNet, HelpAssistant and Support. The command-line command 'net user' also lists all locally stored user accounts.

Although it's possible to delete these three accounts, you will need the Help Assistant Account to run a remote desktop session, and ASPNet is installed by the .Net Framework and must not be deleted if you use programs based on the .Net Framework. Maintaining a Guest account is wise if your PC is accessed by other users.

A less radical solution is to right-click on the accounts and deactivate any you want to secure temporarily, by choosing Properties and selecting the 'Account is disabled' checkbox. Home users should also remember to set a password for the preconfigured Administrator account if this wasn't done during initial Windows installation.

Secure your passwords

During local login to an XP computer, a protected subsystem manages the user name and password. The Security Accounts Manager (Sam) stores the login information

ADS awareness of virus and adware scanners

| PRODUCT	ADS AWARE?
Panda Antivirus	✘
McAfee Virusscan	✔
Softwin Bitdefender	✘
Trend Micro PC Cillin	Partial
Kaspersky Antivirus	✔
Norton Antivirus	✘
Ad-aware	✔
Spybot Search & Destroy	✘
Microsoft Antispyware	✘

as encoded values in a database. Anyone with direct access to a computer – which inludes malware installed on an infected PC – can attempt to use a password cracker to render the secret passwords into plain text. This could take several days for each password if a brute-force attack is employed. The Sam database is already encrypted but it can be further secured using Windows' Syskey tool (see screen 8).

Open a command prompt window and enter the command syskey. You must be logged in as an Administrator to use this tool. After entering the command a window appears in which you should ensure that the Encryption Enabled option is selected. Clicking on Update saves the Sam database key locally on the system and offers two further options: you can either set up an additional system password – which you will have to type in every time the system is started – or copy the key to a disk which then has to be inserted every time the system is started. The second method is more secure – but it requires a floppy disk and will not work with USB sticks.

Repairing NTFS damage

Microsoft has chosen NTFS as the file system for the immediate future. Early experiments with the Windows Vista beta show that the new operating system can only be installed under this system. NTFS is more robust than Fat, can manage more memory and storage and offers granular access rights and refined extras such as encryption. Only a few users realise that all file changes can be logged. This means that the file system can be rebuilt quickly after a crash.

However, it can be dangerous if malware has got onto the system and tries to manipulate the log file. NTFS sets up a special area on the hard disk for file-related information, known as the Master File Table (MFT). This is a relational database
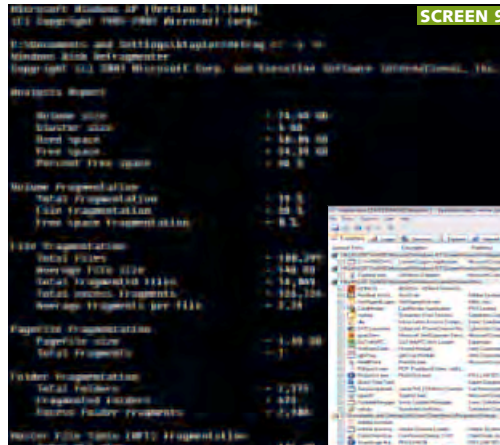
Left: The command defrag c: -a -v gives detailed information about the NTFS Master File Table

Below: Autoruns gives you a list of programs that start when Windows loads

which, by default, reserves 12.5 per cent of the space on an NTFS partition for itself. The command 'defrag c: -a-v' shows information on the size, fragmentation and number of entries in the MFT (see screen 9).

Usually the space in the MFT is off limits for normal files; only if a hard disk looks full will Windows free up space in the reserved area. The catch is that the MFT becomes a target for malware because if the MFT area is damaged, file operations won't work and XP grinds to a halt. The same goes for damage to the MFT itself. The easiest way out of this is to restore a backup image. If you do not have a backup, you can start a repair process using the command 'chkdsk /f' which will attempt to fix disk errors – but success is never guaranteed.

Hidden autostarts

The startup process of an XP computer is very complicated, leading many users to get annoyed that the computer takes so long to boot. Only a few consider what is happening behind the boot screen. If you are trying to identify programs that start automatically when Windows loads, you'll usually look in the Startup folder first.

Often you'll be surprised at what's there: even if you've not added anything yourself there will probably be the Office quickstart and a few other tools. A tip for power users is to make use of the msconfig system tool, which you can start via Start/Run. On its Systemstart tab it lists the objects that start up automatically with Windows.

However, this tool only shows a small portion of what's really going on in the background. A better utility is Autoruns (see screen 10) which you can find at www.sysinternals.com/Utilities/Autoruns.html). This will give you a full overview of what really happens when XP starts and let you remove unwanted services or programs.
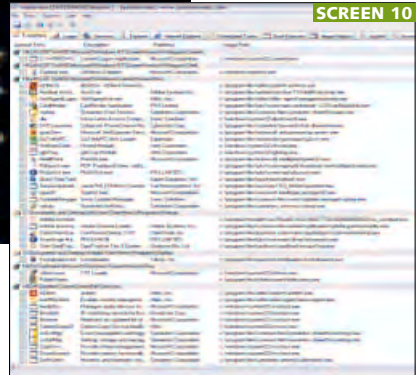
Are your files really deleted?

Under Windows, files and folders can't be fully deleted from the hard disk. The entries are just de-referenced so they no longer show up in Explorer or at the command prompt. This means data you had thought was deleted is in fact still on the hard disk; valuable data often remains on discarded hard disks. Windows marks the space as being available, so sooner or later other data will overwrite the remaining fragments of information. Nonetheless, it's still possible to make the file fragments visible.

Using Windows' built-in tools you can't remove the files completely. Add-ons to do the job can be found for free, for example Eraser (www.heidi.ie/eraser) or as paid-for products such as Safe Erase (www.oo-software.com/de/products/oosafeerase). Programs such as the freeware PC Inspector File Recovery (www.pcinspector.de), can show you which files can be salvaged from the digital dustbin. We'll be looking at the tools available for such data recovery in a future issue of *PCW*.

Peace of mind

It's easy to get paranoid about computer security, but one of the keys to remaining sane is to understand the problem. We've highlighted here some of the new methods hackers can use to compromise your system, which is the first step to being able to defeat them at their own game. It's a sad reflection on the state of personal computing that so much effort these days is consumed just securing your system, but in the long run it's worth it for the peace of mind it brings. **PCW**

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A watertight Registry

The registration database, also known as the Registry, is a total mystery to many users. Application setup routines usually make, or change, dozens of entries in the Registry. Spyware and rootkits often use disguised Registry entries to bury and anchor damaging functions deep in the system. If you use Windows' own tool, regedit, you'll find that it doesn't offer much help in searching for Registry entries. The freeware Regmon utility from www.sysinternals.com/Utilities/Regmon.html, on the other hand, shows you which programs are accessing which Registry key in real time.

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Top 30 Xmas buys

Can't afford your own personal shopper for Christmas? Let PCW's staff take the strain as we give you our very personal gift recommendations

Products are the lifeblood of *PCW* – every month we test and review dozens of them, and select the cream of the crop to receive awards and appear in our Buyer's Guides. But being a democratic lot here, the editorial team rarely gets to highlight any of their own particular individual favourites – those that they'd love to magically appear beautifully gift-wrapped under the Christmas tree, if they don't already own them.

So as the festive season rapidly approaches, we decided to let the team off the leash. We asked each of them to pick five favourite products they've used over the past 12 months or so – devices they'd heartily recommend to any of you who may be stuck for high-tech gift ideas or for your own personal use.

It's quite a revealing list, with a few surprises, but we think there's a diverse range of products that will suit even the most discerning tastes. Before you start dropping blatant hints to friends and family about what you'd like to receive in your stocking this Christmas, take a look at our top 30 choices.

VoIP and photography top the Jones list

I'm a keen photographer, as you'll guess from some of my choices, but the nature of my job also means I have to do a lot of work while I'm on the move. So you'll find there's definitely a bit of theme to my top picks.

Skype

Skype went from a beta product to commercial in mid-2004, and was recently bought by online auction giant Ebay. It's not the only PC-based, free Voice over IP (VoIP) service, but is easily the best. The developers have put real thought into what it offers and, given the chance, it can bring free phone calls to all.

Its latest revision (version 1.4 at the time of writing) adds call forwarding for any user who has a Skype In phone number. In 2005 it added voicemail and the Skype In service. I've always found call clarity to be great, but this type of service is only as good as the extras that come with it. Skype also gives you instant messaging (IM), conference calling, IM conferencing and offers cheap rates for national and international calls. Its growing popularity is also one of its strengths, because there are now loads of add-on utilities and some good hardware phones as well.

There are downsides to Skype though. Unlike MSN, it doesn't currently support video calls natively, although this will be added. You can download a utility called vSkype (www.pcw.co.uk/2138104), though this was not developed by Skype. Also, because it's PC-based, your computer must be on to make and receive calls. Most business VoIP packages are router-based, so if you have a home network, they work whether or not your PC is on. Plus, while these services are typically SIP-based and so can often make free calls to users on rival networks, Skype cannot. But for all these criticisms, Skype is easy to set up, it's simple to find contacts and needs no initial outlay to try it, provided you at least have speakers and a microphone.

Canon EOS 350d

My second choice is the Canon EOS 350d digital SLR camera, which won our Editor's Choice award in *PCW* December 2005.

In 2004 we marvelled at how far DSLR prices had fallen, and that trend has continued over the past 12 months. Add to that the rise in their quality and they really have become a tempting option for anyone who wants to take digital photos but have the benefits and flexibility of SLRs.

I bought the 350d in the summer, and have been impressed by its performance. It is light, fits comfortably in your hand and, thanks to its 8megapixel sensor, takes good pictures even at higher ISO settings. The LCD screen is a little small, but the buttons are logically arranged, so you can quickly alter settings.

Adobe Photoshop CS2

As anyone serious about digital photography will agree, no matter how good your pictures, you need a good photo-editing package. Adobe

Simon says...

Working in *PCW*'s labs means my favourite products change weekly, but these are some that have stuck firmly in my memory.

Foxconn Tuckaway

This PC case is built from aluminium and comes with a micro ATX Socket 775 motherboard, a DVD/CD-RW optical drive and even has a card reader. It's so compact that the power supply is an external unit. Add to that a passive CPU cooler and you have the basis for a quiet media centre.

Miglia Director's Cut Scart

This bit of hardware for transferring VHS to DVD is very easy to use. It's a simple case of connecting the Director's Cut to your VCR via the Scart port and to your PC via Firewire. Software isn't provided but you can use any program such as Videostudio or Windows Movie Maker.

The recorded files are large as the unit copies in full-resolution digital video, but the built-in hardware DV compressor helps to reduce these in size to whatever media you are using. Quality is decent, but only as good as the source you are copying from.

Belfield Tide Plotter UK Ireland & Channel Ports 2006

For a beach fisherman this tidal prediction software is invaluable. Loaded on a PDA, it provides with high- and low-tide information for more than 490 ports in the UK, Ireland and Europe. The only thing I would improve, from an angling point of view, would be to add extra locations to the UK database.

Aopen i915GMm-HFS

One of the few companies to champion the idea of putting an Intel Pentium M notebook processor in a desktop environment, Aopen has kept improving the capabilities of its Pentium M series of motherboards. The latest i915GMm-HFS board uses a 915GM chipset so you can build a capable small PC. The board supports DDR 1 or 2 memory (up to 2GB), x16 PCI Express graphics, integrated graphics with VGA and DVI/I outputs, dual Gigabit Lan and integrated 7.1 audio.

Macromedia Studio 8

I haven't got my hands on Studio 8 yet, but as I've been using Macromedia Dreamweaver and the rest of the Studio package for years, I have a good idea what to expect. Studio 8 has improved and updated the basic Studio packages and added a whole lot more; Flashpaper 2 a pdf maker and Contribute 3, Macromedia's web content manager. The one missing ingredient is Freehand MX, which has been dumped. Also new is the ability of Dreamweaver, Flash and Fireworks to optimise multimedia content for phones and PDAs. It's not cheap, but yes please, Santa!   *Simon Crisp*

Foxconn Tuckaway	www.xenex.co.uk	£233
Miglia Director's Cut Scart	http://store.miglia.com	£199.99
Belfield Tide Plotter	http://www.belfieldsoftware.co.uk	£10.95
Aopen i915GMm-HFS	www.pcnextday.co.uk	£160.98
Macromedia Studio 8	www.macromedia.com/uk	£821

Photoshop is king among some very good (and cheaper) alternatives and its latest version, CS2, builds on that reputation.

It's a difficult package to learn, but every time I fire it up, my 'quick 10 minutes just to check one photo' soon becomes a marathon session as I lose all sense of time. I've yet to open up the package and not learn something new, and it's great for the simplest of tweaks or the most complex changes. If Photoshop is too expensive for you, there are some good alternatives, such as Photoshop Elements or The Gimp, which is free.

Anyone who likes to shoot in the Raw format should also check out Rawshooter Essentials 2005 (www.pixmantec.com), a great, free piece of software that adjusts an image before converting it into tiff or jpeg.

Sony Vaio VGN-TX1XP

I do a lot of work on the move, and my final two favourite products reflect this. The Sony Vaio VGN-TX1XP laptop is ultraportable, has a fantastic screen, inbuilt wireless capabilities, decent battery life and is easy to use.

Considering its size, the Vaio impressed me immensely. It was easy to type on, and powerful enough to cope with the tasks I threw at it. I enjoyed working on it, particularly when taking it home, because it was so easy to carry. It fully deserved the Editor's Choice award it won.

Dell Axim X50

Picked for many of the same reasons as the Sony Vaio, the Axim got a Recommended award early in the year (www.pcw.co.uk/2045061), and I wrote and edited a lot of articles using it. The PDA has its faults – it's too easy to accidentally hit the wireless and record on/off buttons for instance, bringing to a premature end an Internet session or unexpectedly recording the background noise on the train. But if you want a wireless PDA, it is one of the best I have used (and I'm still a big fan of the long-dead Psion 5MX), in part thanks to its large, clear screen.   *Rob Jones*

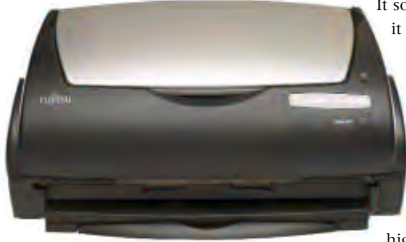|		
Skype	www.skype.com	Free
Adobe Photoshop CS2	www.adobe.co.uk/products/photoshop	£402
Canon 350d SLR	www.canon.co.uk	£561
Sony Vaio VGN-TX1XP	www.sonystyle.co.uk/business	£1,699
Dell Axim X50	www.dell.co.uk	£253

Keeping up with Kelvyn

I'm one of those people who are convinced that with just the right piece of technology, I can make my life much more organised and productive. It never seems to work out exactly like that, though – and my desk is littered with the proof. Anyone know of a good junk management course?

Fujitsu Scansnap II Plus

One of the most useful items on my desk is this superb miniature document scanner from Fujitsu. It's a fast, compact, full duplex, 600dpi sheet-feed model that can scan directly to pdf format or, using the bundled Abbyy Finereader OCR plug-ins, to Word or Excel. It also doubles as a business card scanner and organiser, courtesy of the excellent Cardminder application. It even does a reasonable job of scanning photos to jpeg files, but its real party piece is scanning a folded A3 document and seamlessly re-stitching the two halves together in Acrobat 7 (the Standard version is free with the scanner). If you're fed up with overstuffed filing cabinets or drawers, get one of these.

Wacom Graphire4 Studio XL

Although the computer mouse was a great invention, it still has many limitations when fine control of the cursor is required. And especially for me, as rather bizarrely I'm left-handed but can't use a mouse with my left hand. Pen tablets have been around for a while, and offer much more intuitive cursor control for applications such as drawing or touching up digital photos. They've usually been aimed at graphics professionals though, with price tags to match, but the Graphire4 range is aimed squarely at the home user – the A5 Studio XL version comes with a copy of Photoshop Elements 2. I find it great to use for photo editing, although I still prefer to combine it with a mouse for coarse menu navigation – to do this with the pen you have to hold it slightly above the tablet surface which takes a bit of getting used to.

Imation Disc Stakka

I hate storing CDs and DVDs, as I always manage to break the jewel cases or lose them down the back of my desk. So it seems that the Disk Stakka was designed especially for me – it's a motorised disc carousel that can store and catalogue up to 100 12cm optical discs of any format. It's not a disc reader, but at this price you wouldn't expect that. It's the next best thing though – put a new disc into the slot and the Opditrack software lets you add a title or comments, and optionally catalogues the contents by prompting you to insert it into your PC's disc drive. It sounds complicated, but it isn't – I use mine for storing dozens of *PCW* cover discs and Opditracker lets me quickly search for any particular disc or content. If you fill it up, the units can be stacked up to five high, all powered through a single USB connection. It's a boon for those who are born to clutter.

Mailwasher Pro 5

Spam is the scourge of the connected world, and everyone has their own favourite anti-spam solution. Mine happens to be Mailwasher Pro, which I've been using almost since it was launched. It's a testament to how much I like it that when Firetrust bought the product and started charging, I happily coughed up my $37 for the Pro version – although there's still a freeware version available at www.mailwasher.net.

Version 5 introduced a much better user interface and Bayesian filtering. But what I really like about it is that it's one of those programs you can just install and forget – it simply gets on with its job, asking for minimum input after you've trained the filter for a few days.

One of its best features is the ability to preview dubious emails before they're even downloaded to your PC, which is another great security feature.

Doom 3

I'm not a particularly keen gamer, but every now and then I get hooked for a couple of months. That was the case when Doom 3 hit the streets at the end of 2004 – having played the original, I couldn't resist seeing how it would look using a modern state-of-the-art graphics engine. And I wasn't disappointed – it's a subtly reworked version of the original game, but with glorious graphics and sound effects. The same cast of evil zombies and creatures are lurking in every gloomy corner, but this time with some seriously nasty twists. It's definitely not a game for those of a nervous disposition to play alone – but for the ultimate atmospheric experience, turn up the scary multi-channel sound track, dim the lights and keep your finger firmly on the trigger.

Kelvyn Taylor

Fujitsu Scansnap II Plus	http://scansnap.fujitsu.com/	£316
Wacom Graphire4 Studio XL	www.wacom.co.uk	£179.99
Imation Disc Stakka	www.imation.co.uk	£89
Mailwasher Pro	www.firetrust.com	$37 (£20 approx) download only
Doom 3	www.doom3.com	£19.99

Will's wishlist

As reviews editor, I probably get to see more products than the rest of the *PCW* team, which means I have many to choose from. But, by keeping in mind my interest in photography and digital home products, I've managed to narrow down my shortlist to five.

Pentax Optio WP

If there's one area of IT that's been booming for the past five years or so, it's digital photography. While some manufacturers seem determined to concentrate on megapixel counts, Pentax caught my eye with its Optio WP. Looking much like a standard digital camera, it's totally waterproof up to 1.5m. Cover it in sand when taking photos on the beach and you can simply clean it under the tap when you get back. Image quality might not be the best, but it's certainly enough for most amateur photographers.

Dialogue Flybook

Another product that impressed me is the Dialogue Flybook notebook. Small, sleek and crammed with features, it's a commuter's dream. Slap a Sim card into the side and you get Internet access through either a 3G or GPRS connection. Better still, the 8.9in screen also swivels round to provide tablet-style functionality. It's by no means perfect though. The decision not to go with Microsoft's Tablet Edition of Windows was a huge mistake. Dialogue's version, called Ritepen, doesn't

do the Flybook any favours. Other shortcomings, such as the lack of 802.11g and the high price tag hold it back. Nevertheless, if Dialogue ironed out the teething problems I can see a bright future for the Flybook.

Creative Zen Nano

Portable media players have had their fair share of the limelight over the past year and my vote goes to the Nano. No, not Apple's Ipod Nano, but Creative's Zen Nano. Cheaper than Apple's version, it also sports an FM radio, mp3 encoding and a voice recorder. OK, it might not look as good as the Apple Nano, but what it lacks in style it certainly makes up for in functionality. Hopefully Creative will keep up the pressure on Apple in the portable audio market – after all, it's been in this game far longer.

Archos AV400

While Apple's busy touting its new Ipod that plays video, portable video player manufacturers such as Archos probably aren't too worried. I reviewed the AV400 as part of a portable video player group test and, without a shadow of a doubt, it was the best device there. Not content with just playing video and audio, the AV400 is also capable of acting as a personal video recorder (PVR). Hook it up to your TV and it will schedule recording just like any other PVR. Perhaps Apple's new Ipod will kickstart the whole industry, but if you're looking for video on the go, take a look at the new AV700.

Available with a whopping 100GB hard drive and capable of DVD playback quality on your TV, it's set to be another winner from Archos.

Shuttle M1000

The M1000 from Shuttle must have Microsoft rubbing its hands with glee. Other manufacturers have tried to produce sexy looking Media Center PCs that you'd be happy to place in your lounge, but this is the first one I've seen that looks like a piece of home entertainment kit. The glossy black case oozes quality and, thanks to the Pentium M processor, it doesn't require much cooling.

Media Center isn't everyone's cup of tea, but Shuttle has done its cause no harm with the M1000, making it one of my favourite pieces of kit this year. *Will Stapley*
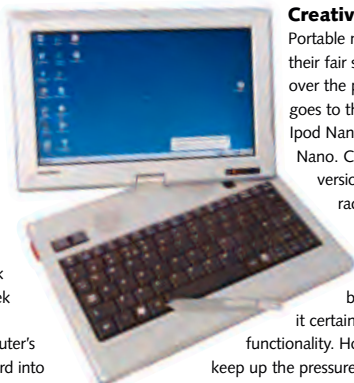
Pentax Optio WP	www.pentax.co.uk	£169
Dialogue Flybook	www.flybook.biz	£1,399
Creative Zen Nano	http://europe.creative.com	£69
Archos AV400	www.archos.com	£299
Shuttle M1000	www.shuttle.com	£1,422

Rory's rollcall

It's easy to get blasé about new technology when you're in our profession. We play with the latest gizmos and return them without batting an eyelid. However there are some products that manufacturers would have to forcibly remove from me if they wanted them back! The following are just a few.

Homechoice

My top pick, Homechoice, isn't your average Internet service provider. The company was the first in the UK to provide a broadband Internet service that also allows consumers to watch television over a phone line. The service didn't meet the expectations of some early adopters, but Homechoice has become a very accomplished product in recent times.

Customers now get access to over 1,000 movies on demand, plus the ability to replay some of the most popular digital TV broadcasts up to a week after they first aired. Homechoice provides ADSL speeds up to 8MB, and is currently trialling a 24Mbits/sec ADSL2+ service. It's not hard to envisage a time in the future when all TV will be accessed in this manner.

T-Mobile MDA Pro

The T-Mobile MDA Pro is a phone at heart, but it also includes integrated Wifi connectivity as standard, Bluetooth plus Push email, so you get your Pop3 messages forwarded automatically to the handset.

In previous issues of *PCW*, Reviews editor Will Stapley has written in depth about the need for smartphones to have smart designs, and T-Mobile seems to have got the MDA Pro's design spot on. It is large, but because it's slightly larger than your average PDA, it has the luxury of a full Querty keyboard that can legitimately be used to type long documents. Its large size might earn you odd looks when holding it to your ear, but if you want to achieve excellent mobile productivity without having to lug a notebook around, it is hard to beat.

Half-Life 2

As an ardent gamer, I couldn't leave out Half-Life 2, which is quite simply the best game of the year and arguably the best game I've played in the past five years. Doom 3 may have been released to great fanfare, but its fancy graphics weren't enough to sway me. Besides, the whole thing was so dark I couldn't work out what was happening.

Half-Life 2, on the other hand, didn't hide behind a veil of darkness to promote a

Clive raids the toyshop

Writing for *PCW* is sometimes like working in a toyshop: there are lots of things to play with but no time to do it in. So time would be my first choice, if only it could be bought! Failing that I've chosen three products that can help me work faster and two for play.

Motion Computing LE 1600

I'm a Tablet PC enthusiast, though I believe the interface will take decades to mature and that current hardware gives us only a taste of its potential. My hunch is that a small tablet drawing most of its resources from the network will eventually become the dominant platform, so I need to use the format to understand where computing is going.

I also need a machine I can carry easily – unlike most notebooks, which are luggable rather than portable. I prefer to plug in peripherals rather than having them built in so I don't have to carry them when I don't need to.

On specifications alone, I'd choose one of two 1kg tablets: the Fujitsu-Siemens Lifebook 1510, which has an 8.9in screen, or Motion Computing's LS800 with an 8.4in screen. But as I haven't had a chance to look at either of them properly, I've picked Motion's LE1600 (reviewed *PCW* September 2005), with its 12.1in view-anywhere screen.

Dragon Naturally Speaking 8

This voice-translating package is a must for my Tablet PC. The LE1600 includes noise-cancelling microphones, allowing you to dictate to it without using a headset. As I wrote in *PCW* September 2005, voice input can be seriously useful with perseverance and you can use it in conjunction with the Tablet's handwriting recognition. You'd think that two fuzzy inputs would double your mistakes, but in practice it is viable to correct dictated text by hand.

In truth neither the Tablet's hardware, nor the operating software, is up to coping gracefully with this class of multi-modal input. But by using it you will be helping the development of the human-computer interface, which is easily the biggest bottleneck in IT.

One Note 2

You would expect a journalist to be interested in a utility that can synchronise the recording of an interview with typed or handwritten

Breakthroughs in gaming technology don't always translate to new or innovative games, but games developers have embraced the DS in order to create titles that were previously impossible.

The bizarre Project Rub from Sega and the ingenious Yoshi Touch & Go from Nintendo itself (where you must manually draw platforms for your falling character to land on) are just a few of the possibilities offered by this wonderful device.

Napster

Napster has now completed its bizarre metamorphosis from public enemy number one of the record industry, to one of its biggest and most prized assets.

Apple's Itunes is more popular, but I like Napster for the wider variety of options it provides to users.

Naturally, you can buy songs on an individual basis, but more interestingly you can also take out a subscription to the service for less than £10 a month and

download as many songs and albums as you like.

You can even transfer the music to a portable audio player for listening on the go. Sure, you'll lose the right to listen to any music you've downloaded once you stop subscribing – perhaps its biggest flaw – but music fans will love the freedom of listening to almost any song they like without paying through the nose for it.   *Rory Reid*

feeling of tension. Its gripping storyline was enough to unearth a wide range of emotions, and the imaginative set pieces wouldn't look out of place in a Hollywood blockbuster.

Nintendo DS

Yes, the Sony PSP looks sexier and it has a lot more functionality, but the DS is testament to Nintendo's unwavering innovation over the past decade.

It is the first handheld gaming console since the original Nintendo Game & Watch to use two screens – one of which is touch-sensitive. This technology is nothing new, but opens up a wealth of possibilities in gaming applications.

Homechoice	www.homechoice.co.uk	From £17.99 per month
T-Mobile MDA Pro	www.t-mobile.co.uk	From £139
Half Life	www.half-life2.com	£34.99
Nintendo DS	www.nintendo.com	£99.99
Napster	www.napster.co.uk	£14.95 per month

notes. But it can be useful to students, business people and anyone else who has to take notes.

One Note 2 is one of those simple ideas that can completely change the way you work, saving hours of scrolling through recordings searching for a particular passage. You can use it on the desktop as well as on tablets: I use it for phone interviews – though I have yet to find a gizmo that will pump a clean sound from the phone to my PC.

Pinnacle Showcenter

Home networking is at about the stage the PC was 20 years ago: barely accessible by non-techies and with few of its future users aware of why they will want it. The Showcenter is one of a class of devices that will help create that future market.

It's a smart box, styled for the living room, that connects to your TV via a Scart lead and to your PC via a wireless

or (preferably) wired network link. It allows you to keep all your home videos, TV recordings, and family snaps in one place and to pull them to your living room when required.

The interface is primitive, as with all similar products today; but, as with the Tablet PC, you qualify as a pioneer simply by using it.

Roland GR-20GK

I was tempted to pick Marshall's MXL Desktop Recording Kit (reviewed on page 51) for my final choice because the need for an excellent condenser microphone is not restricted to musicians. But I didn't want to repeat myself and decided instead to plump for a personal indulgence.

The Roland GR-20GK Midi-enables virtually any steel-stringed guitar, which

means that in theory you can make it sound like virtually anything. A normal electric pickup outputs audio; the GR-20GK translates the notes you play into instructions that can be attached to any instrumental sound; and it has foot-pedal controls and a built-in synthesiser that you can use live on stage.   *Clive Akass*

Motion Computing LE 1600	www.motioncomputing.co.uk	£1,773
Dragon Naturally Speaking 8	www.scansoft.co.uk	£79.99 (Standard edition)
One Note 2	www.microsoft.co.uk	£71.99
Pinnacle Showcenter	www.pinnaclesys.com	£199
Roland GR-20GK	www.roland.co.uk	£349 (with special pickup)

Practical advice from the industry's experts

TECHNICAL TIPS AND TRICKS

PC noise and power consumption are hot topics these days, with more and more people wanting to put their PCs in the living room without the risk of deafening their family or tripping a circuit breaker. In his Hardware column Gordon Laing has recently been looking at various ways of reducing noise and power consumption in desktop PCs, and this month he's investigating the benefits and limitations of Intel's Speedstep technology.

Ken McMahon's Digital imaging and video column takes the form of a round-up of portable disk-based photo storage devices. Ken has looked at four of these handy products that free you from the worry of running out of flash storage cards while you're out and about. A great addition to any keen photographer's Christmas wishlist.

You may have heard stories recently about the introduction of I-mode-capable mobile phones to the UK. In his Web development column, Nigel Whitfield investigates the differences between this technology for browsing on mobile phones and its rival, the much-maligned Wap.

HANDS ON

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25 PAGES OF...

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- TECHNIQUES
- WORKSHOPS
- HARDWARE SOLUTIONS
- SOFTWARE SOLUTIONS
- Q&A

Left: Discover in the Hardware column how heat and power can be reduced with Speedstep

Right: Store loads of photos while you're on the road; find out how in Digital imaging

Advice from our experts

If you have a problem, let one of our team of experts help

WINDOWS
Keeping an eye on spyware

Q I have a Windows 98SE system which seems to have been invaded by some malware that Norton Anti-virus 2004 and Webroot Spy Sweeper cannot detect, and which McAfee firewall did not intercept. All these programs are up to date. However, some infected emails have been dispatched without my knowledge – I only found out when they were returned as infected from addresses I had never heard of. I have loaded a utility called Noadware.

When this scans it finds several hidden partitions on my hard disk that contain stuff which, judging by the titles, no-one would want on their computer. Windows cannot find these partitions and neither can Dos.

How can I purge this stuff from my computer?
PJE D'Alquen

A The most likely reason for the 'returned' mail is that your address has been spoofed. The messages did not come from your computer but your address has

Use Ad-Aware to help prevent spoofing and spyware

been harvested – possibly from someone else's infected computer. Second, Noadware has been criticised for, among other things, producing false positives. See, for example, the review at http://snipurl.com/hw7s.

Your security measures seem more than adequate but if you want a second or third opinion, try Ad-Aware or Spybot (see www.cexx.org/noadware.htm) and the Coolwebsearch removal tool from www.trendmicro.com/cwshredder. Trend also does a general spyware removal tool, but we have yet to try it.

HARDWARE
Quieten down

Q I'm looking into options to quieten my Media Center. I'm thinking I could locate the noisy PC in another room and use long cables or an extension system to get the signal and controls to my living room. What do you think?
Steve Morris

A Cable length is the biggest problem, as 5m is seen as the longest distance for keyboard, mouse or USB cables. Video signals also suffer over distance and, while 10m is possible, you need a very high-quality cable. For longer distances you should look into a keyboard/video/mouse extender which transports the signals over Cat-5 Ethernet cable. Video quality will vary, but to maintain HD signals you could use lengths over 100m. Alternatively you could stream content to a silent Media Extender device connected to your TV and hifi. You would also need an infra-red extender to use your Media Center's remote control. Wireless versions are available from www.maplin.co.uk or www.satcure.co.uk for around £30-40.

HARDWARE
Is it worth upgrading an old PC?

Q I've been asked to look at the upgrading potential of a seven- or eight-year-old system with a Cyrix processor.
Ian Steer

A The degree by which any PC can be upgraded is almost entirely defined by its motherboard. The model should be listed as part of the original PC's specifications, or is normally marked on the motherboard itself. Once you know the model, you can visit the motherboard manufacturer's website and download the manual or technical specifications, which will tell you

exactly what type and speed of components can be used. Also check for any Bios updates which may support newer or faster components.

Seven or eight years is a long time in the PC industry and many parts for this system will probably have long been discontinued. Some older processors may be available on the second-hand market, but you often have to pay well over the odds for them. Some companies specialise in upgrades for older systems though: Powerleap (www.powerleap.com) offers a number of processor upgrade options and a utility that can identify what's possible. Once

you know your motherboard model, it's also worth entering it into website of memory suppliers such as Crucial at www.crucial.com/uk to see if compatible memory is still on sale.

Alternatively, you might consider a new motherboard to be the answer, but this will probably need a new processor and new memory, along with a new power supply.

Ultimately many people end up concluding that the upgrade potential of an older system is either too modest or expensive. It is of course up to you, but a new budget PC could easily outperform it and it should be simple to transfer data files from one to the other.
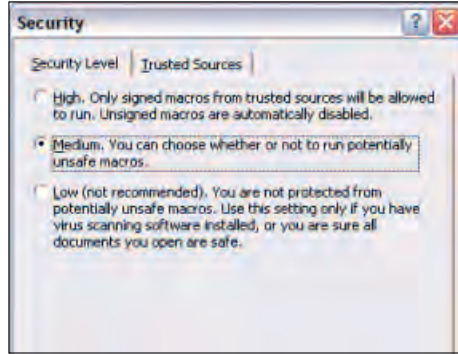
SPREADSHEETS
Macro mistake

Q I entered one of the macros from your Spreadsheets column and chose the shortcut you recommended, but when I went back to Excel it wouldn't work.

The computer was telling me that my macros were disabled because of the security risks. I've no idea what on earth it is talking about. What's the problem?
Simon Glover

A On the Tools menu, select Options, Security, Macro security. You have a choice of High security where macros won't run; Medium where you get a warning each time you try to run a macro and can then choose whether to run it or not, or Low where macros run immediately.
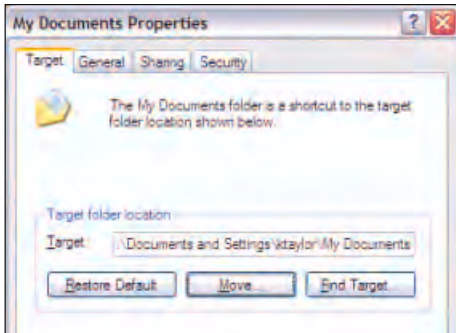
Medium security is probably the wisest setting.

Set your macro security level via the Tools menu

WORD PROCESSING
Quick keyboard commands

Q I have a distant memory of a tip to show all the custom keyboard assignments for commands, macros and special characters in Word, without having to go through each command in Tools, Customize, Commands, Keyboard. How do you do this?
Roland Davis

Changing the location of My Documents is very easy

A There are two ways of doing this. First, go to Tools, Macro, Macros… and in the 'Macros in:' list, select 'Word commands'. In the list that appears above, select 'ListCommands' and choose 'Run'. You'll be offered a choice between 'Current menu and Keyboard settings' or 'All Word commands'. Your choice will appear as a Word table in a new document. If you want a shorter version, go to File, Print… and in the 'Print what' list, select 'Key assignments'. This will print a list of the custom key assignments sorted by the current template and the global (normal.dot) one.
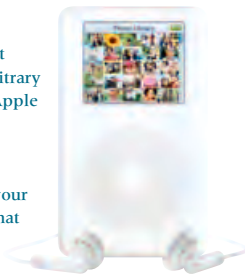
DIGITAL IMAGING
Portable pod

Q Is it true that it is not possible to store arbitrary data formats on an Apple Ipod music player – that is, you can't use it as a portable hard drive?

If so, I would appreciate your guidance on an mp3 player that combines both features.
Abdullah Al Heyari

Copy anything to an Ipod's hard drive

A Yes, you can use an Ipod in Disk Mode and copy anything to its internal hard drive. On recent colour Ipods you can also view image files.

See this month's Digital imaging and video column (see page 142) for a round-up of portable devices suitable for downloading images from flash memory cards.

WORD PROCESSING
Finding .doc

Q Where is normal.dot located in Word 2003 under XP Pro? I did a search of the whole drive for *.dot (with hidden files switched on), but this did not find it. Yet the help file says it exists and can be modified.
David Mason

A By default it resides with the other templates in \ Application Data \Microsoft \Templates. The location of the Application Data folder depends on your version and configuration of Windows – it should either be under a user profile or in the Windows folder. A smart way to find the templates folder is to run Word and go to Tools, Options, File Locations. This will reveal the location of User Templates, and let you change that location.

DIGITAL IMAGING
SLR scanning

Q I have many years worth of photographs taken with my SLR that I'd like to scan. Do you know of a device that automates this process?

I have found a negative/slide scanner from Minolta but nothing which specifically handles prints. Do you have any suggestions as a standard flatbed is so tedious it would take years?
Richard Burke

A You could try a flatbed scanner with an automatic document feeder. These are generally intended for OCR applications and you might have limited success using it for photo scanning. Different sized photos on different sizes, thickness and quality papers are likely to cause feeding problems.

HP produced an automatic photo feeder for the Scanjet 5500C series, but it had a mixed reception and came in for criticism due to feeding problems.

The best solution is probably to opt for a flatbed that can scan several images simultaneously and save them to separate files. Most allow you to do this, but check the specs before committing yourself.

DATABASES
Talking in code

Q I have an undocumented app, but parted company with the developer. The database is SQL Server connected via ODBC. The code looks as if it should go through every row in a table. The code is:

```
Set dbs = CurrentDb
Set rst = dbs.OpenRecordset↙
("Master_Planned")
rst.MoveFirst
For a = 1 To rst.RecordCount
```
(Key: ↙ code string continues)

RecordCount is 1 but there are thousands of rows, so it only went through once.
Mayo Marriott

A RecordCount doesn't count the number of records in a dynaset-, snapshot- or forward-only–type Recordset object until all records have been accessed. Try forcing the last record to be accessed by using the MoveLast method on the Recordset object with this code:

```
Set dbs = CurrentDb
Set rst = bs.OpenRecord↙
set("Master_Planned")
rst.MoveFirst
rst.MoveLast
For a = 1 To rst.RecordCount
…….
Next
```

SPREADSHEETS
Printing breaks

Q I print a lot of spreadsheets, so I need to be able to see where the page breaks will be. Is there a way to make Excel do it automatically?
Jeremy Posnansky

A If you click the Print Preview tool, then the Close button, when you return to your worksheet the page breaks will be displayed. This applies to new or existing files. You could also display page breaks with the shortcut Ctrl & Shift & P if that shortcut runs this simple macro:

```
Sub Breaks()
ActiveSheet.DisplayAutomatic↙
PageBreaks = True
End Sub
```

Save this macro in your XLSTART folder to make it available globally.

SPREADSHEETS
Sheet security

Q Assuming Excel isn't that secure, what form of competent file security would be recommended nowadays for protecting passwords?
Richard McCleery

A There are a number of programs on the Internet that claim to crack passwords but, starting with Excel 2002, Microsoft has been offering digital security. This at least guarantees to approved others that your file is safe and can give you confidence in files provided by others. Microsoft Authenticode technology enables you to digitally sign a whole file or just a macro and give it a digital certificate. The certificate confirms that the Excel workbook or macro was created by the person who signed it and the signature confirms that it has not been altered. On the Excel Tools menu, select Options, Security, Digital


A digital certificate can verify authenticity

signatures. Here you can allow files or macros to run or not, based on whether they are digitally signed by anyone on your list of trusted sources. You can obtain a digital certificate from a commercial certification authority, such as Verisign or you can create a digital signature yourself – see 'Create your own digital certificate' on the Microsoft Office website.

WORD PROCESSING
Top of the page

Q I'm using Ability Write and trying to print near the top of the sheet by setting the top margin to 10mm. I know my printer is capable of this, but setting the margin to 10mm in Page Setup doesn't work. Is there a way round this?
Al Floyd
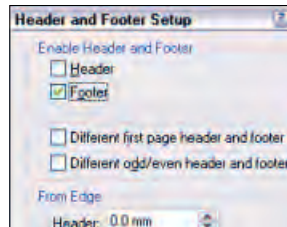
A There is – what is happening is that the header area is pushing your top margin down. If you go to View, Header and Footer setup, then clear the Header checkbox in 'Enable header and footer', you will find you can set a smaller top margin.

WORD PROCESSING
Add up your hours

Q I need a spreadsheet to add up time. Excel will add up hours and minutes using hh:mm until it reaches 24:00 then it starts a new day, but I want to keep on adding hours and minutes.
Mike Dyer

A In your SUM cell, use the Custom format [h]:mm. The square brackets do what you want: they will continuously add hours and ignore days. Microsoft calls this feature elapsed time.

Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

→ **Comments welcome on the Hardware column.**
Email hardware@pcw.co.uk
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Curb your consumption

Intel's Speedstep enables PCs to reduce power requirements and cut down on heat

After years of increasingly power-hungry processors, it's reassuring to see that power-saving technologies are becoming widespread on desktop platforms. Last month I put the Athlon 64's Cool'n'Quiet technology through its paces, and this month it's the turn of Speedstep for the desktop Pentium 4.

Enabling Speedstep

Intel's Speedstep technology was originally developed for its Pentium M processor, to give Centrino laptops a longer battery life. It was realised that the same power-saving technologies could be relevant for desktop systems. Power consumption would be reduced, and the decreased heat generation would allow quieter cooling.

With the launch of its 600 and 800 series Pentium processors, Intel brought Speedstep to the desktop. On these processors it's called Enhanced Intel Speedstep Technology (EIST), and you'll find it on all 600 series Pentium 4s and all 800 series Pentium Ds, apart from the 820 and 840 Extreme Editions.

While EIST uses the same dynamic underclocking and voltage reduction techniques as Pentium M processors, the implementation differs. Where Speedstep on the Pentium M uses a wide range of intermediate steps, from full down to the lowest speed, EIST offers only two: the normal speed of the processor running at full whack, and a reduced clock of 2.8GHz.

This 2.8GHz lowest speed applies across the range of current 600 and 800 series processors and explains why the model 820 doesn't support EIST – it runs at a maximum speed of 2.8GHz. The two states and minimum 2.8GHz frequency of EIST seem primitive next to the Cool'n'Quiet technology of AMD's Athlon 64 processors, which features several reduced states including a lowest one of 1GHz at 1.1v.

Dynamic underclocking helps save power

Intel's Speedstep and AMD's Cool'n'Quiet technologies use the same techniques to save power. Both recognise periods when the processor is running idle and underclock it to a slower frequency. Once the processor is under load again, it's reclocked back to its normal state.

Underclocking alone may allow a processor to consume slightly less power, but the clever part, implemented by Intel and AMD, is to combine it with a reduction in voltage. Since power is the product of the voltage squared, even small reductions in voltage can result in power savings.

If you reduced the voltage of the processor while it was running at full speed, it would probably become unstable. But with it clocked at a lower speed, the voltage can be lowered with no stability issues. The voltage in these systems can be switched virtually instantaneously.

The Pentiums that will benefit most from EIST are those normally clocked at higher speeds. Slower models such as the 630, which runs at 3GHz, would drop a mere 200MHz. So to give EIST a fair show I tested it with one of the fastest model 600s: the 660, which has an official top speed of 3.6GHz.

I fitted the Pentium 4 660 into a Gigabyte GA-8N-SLI Pro motherboard with Zalman's large but effective CNPS9500-LED for cooling. The test configuration was completed using a Gigabyte NX66256DP Nvidia Geforce 6600 PCI Express graphics card, 1GB of Crucial DDR2 memory running at 666MHz, an NEC 3520A DVD drive and a 400GB Seagate Barracuda 7200.8 hard disk running Windows XP Media Center Edition 2005.

With Windows' Power Control Panel switched to Always On and My

Gigabyte's GA-8N-SLI Pro motherboard was used to test EIST

Computer reporting the processor running at the full 3.6GHz, the test configuration consumed 115w when idle. To put the processor under heavy load, I used Dr DivX to encode a 12.5-minute mpeg2 vob file. During the encoding process with an average load of 76 per cent, the system's power consumption leapt up to between 195 and 201w. The encoding was completed in 13 minutes, 34 seconds.

According to Intel's instructions to activate EIST, I switched Windows' Power Control Panel to Minimal Power Management. Opening the properties of My Computer revealed that the processor was still identified as a 3.6GHz model, but the clock frequency had reduced to 2.77GHz; it appeared EIST had already identified a sufficiently idle period to clock itself down.

During the same idle period with EIST enabled, power consumption stayed at 115w. I repeated the DivX encoding test, which averaged a 76 per cent load, but power consumption jumped between a greater range – from 148 to 201w. This time the encoding process took almost one minute longer: 14 minutes and 28 seconds.

This was unexpected. Previous tests with Speedstep on the Pentium M and Cool'n'Quiet on the Athlon 64 proved both processors could perform at their

maximum speed under load, whether or not the power-saving technology was enabled. Their power saving kicked in during idle periods. But EIST seemed to be having a detrimental effect on performance under load, while making no difference to power consumption when idle.

Seeking a solution

To understand, I needed more tests – first, to see how a 2.8GHz Pentium 4 performed at top speed. I manually underclocked the 3.6GHz processor in the motherboard Bios by dropping its clock multiplier from 18 to 14 times.

With power set to Always On, the 2.8GHz processor encoded the DivX file in 17 minutes, consuming between 182 and 185w; although it consumed 115w when idle. So with EIST enabled, the 3.6GHz Pentium 4's performance may be slower than its maximum speed, but it isn't performing like a 2.8GHz part.

Second, I needed to find out what the processor voltage was doing during these tests. I downloaded the CPU-Z utility from www.cpuid.org which identifies information about a system.

With Minimal Power Management enabled, CPU-Z reassuringly showed the current clock switch between 2.8GHz and the processor's top speed when idle or under load respectively. When idle at 2.8GHz, the voltage jumped between several states from 1.136 to 1.168v. Under load and automatically clocked to 3.6GHz, the voltage again jumped between multiple states but the range was much larger: from 1.136 to 1.312v.

CPU-Z showed the same figures when power management was set to Always On. During idle periods, it reckoned the clock speed was 2.8GHz and the voltage between 1.136 and 1.168v. Under load, it again identified the processor as being clocked at 3.6GHz, although, while the maximum voltage was 1.312v, the low was 1.280v.

These voltage readings explain why the power consumption when idle was the same regardless of Windows' power-management settings. The processor had already clocked itself down to 2.8GHz with a lower voltage regardless of Windows' power settings.

I believe this is due to the implementation of an existing Intel power-saving technology called C1E Enhanced Halt State. This can also reduce the processor's clock multiplier to 14x, which for current Pentium 4s is 2.8GHz. C1E is automatically activated when Windows is idle and issues a Halt command.

The CPU-Z utility can reveal the clock frequency and voltage setting used by your system at any time. Here it's showing the 3.6GHz processor is currently clocked at 2.799GHz, despite EIST not being enabled

EIST has more voltage levels to work with than C1E, which was confirmed while monitoring the process with CPU-Z. While EIST consumed less power overall when the system was under load, it seemed to do so at a slight cost of performance. The power consumption when idle was identical.

EIST enabled?

These are the results from a single benchmark run on a single test rig, so there could be configurations or applications where EIST is more effective. Judging from these results alone, I would not enable it. The power consumption when idle was the same with EIST as with C1E, but the latter didn't compromise performance under load – at least, not in these tests.

I'll revisit this subject with different applications and configurations to see how EIST performs. In the meantime, it's interesting to compare the Pentium 4 with the Athlon 64.

Last month I ran tests on an Athlon 64 4000+ system using the same graphics card, hard disk and optical drive. Both systems used an Nvidia Nforce 4 chipset, although these were different versions for Intel and AMD processors. To make a fair comparison, I clocked the Pentium 4 down to 3.2GHz where it performed almost identically to the Athlon 64 4000+ in Sysmark 2004 and my DivX test.

When idle, the Athlon 64 system consumed 91w, which fell to 80w with Cool'n'Quiet enabled. In contrast, the 3.2GHz Pentium 4 consumed 115w when idle and automatically clocked to its lowest power-saving speed of 2.8GHz (with or without EIST).

While running the DivX encode, the Athlon 64 system consumed 136w, compared to between 148 and 192w with the Pentium 4 and EIST. Interestingly, the Athlon 64 took the same time to perform the encode whether Cool'n'Quiet was enabled or not, whereas the Pentium 4 took 30 seconds longer with EIST enabled.

These are narrow results for a single application and configuration, but the difference between the platforms is significant. The Athlon 64 architecture appears to have an advantage over the Pentium 4 600 series in terms of overall power consumption. I plan to test the Pentium M with as similar a configuration as possible, along with dual-core processors, to see how they rank in terms of power consumption. **PCW**

What you need to run EIST

To take advantage of a processor with EIST, you'll need a Bios and chipset that support EIST, along with a motherboard which supports Dynamic Voltage Identification (Dynamic VID). You'll additionally need an operating system which supports EIST, such as Windows XP SP2.

EIST is disabled by default in SP2, so to switch it on you'll need to select Minimal Power Management from the Power Control Panel. To turn it off, select Always On from the Power Control Panel. To verify that EIST is enabled, open the Properties of My Computer, where you'll see the processor's model listed as usual, but below it the clock speed will read 2.77GHz – see screens (right).
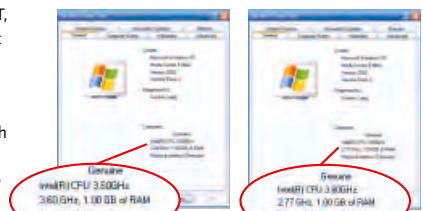
Left: To check if EIST is enabled, open the properties of My Computer. If the two processor speeds listed are identical, EIST is disabled
Right: To enable an EIST-compliant system, set the power control panel to Minimal Power Management. The properties of My Computer will show the clock frequency as 2.77GHz

Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

→ **Comments welcome on the Performance column.**
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Breaking the 4GHz barrier

Boldly go where no processor has gone before and see how far you can push your P4

In this month's Hardware column I've tested Intel's power-saving technology using a 3.6GHz Pentium 4 660 processor, and I couldn't resist seeing how far it could be overclocked.
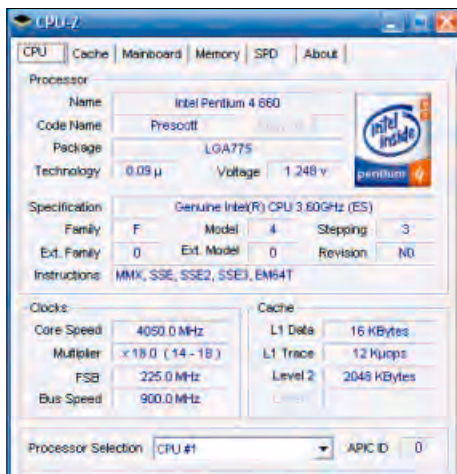
The 660 is close to the top end of the current P4 range. After steadily increasing clock speeds for years, Intel is now concentrating on alternative performance-boosting technologies such as dual-core processors and enhanced architectures. In the meantime the single-core P4 line has peaked with the 3.8GHz Model 670.

Will we see the Prescott core clocked above 4GHz? Perhaps not officially, but if you're willing to overclock you could break the next big Gigahertz milestone yourself. As always, overclocking will invalidate your warranty, could reduce your processor's lifespan and you do it at your own risk.

Pushing the boundaries

The P4 600 series lets you adjust its clock multiplier, but only downwards in order to implement power saving. The 660 can be set from 14 to 18 times which, when multiplied with its external bus frequency of 200MHz, gives a choice of clock speeds between 2.8 and 3.6GHz. To overclock it beyond the official maximum speed of 3.6GHz, you'll need to increase the bus speed.

For the overclocking tests I used the same configuration as described in the Hardware column: the P4 660 fitted in a Gigabyte GA-8N-SLI Pro motherboard with Zalman's CNPS9500-LED for cooling. To this I fitted a Gigabyte NX66256DP Nvidia Geforce 6600 PCI Express graphics card, 1GB of Crucial DDR2 memory running at 666MHz, an NEC 3520A DVD drive and a 400GB Seagate Barracuda 7200.8 hard disk running Windows XP Media Center Edition 2005.

The Pentium 4 660 overclocked from its standard speed of 3.6GHz to over 4GHz. This was easily achieved without increasing the voltage

I ran Sysmark 2004, 3Dmark05 and a separate DivX encoding run on a 12.5 minute mpeg2 vob file, all with Windows' power management set to Always On. With the default settings and the processor clocked at 3.6GHz, Sysmark and 3Dmark05 scored 218 and 2,560 respectively, while the DivX encode took 13 minutes, 24 seconds.

Small increments are best when overclocking – it's easy to identify the point where you went too far and return to the last configuration. Increasing a 200MHz bus by 10MHz at a time is a good start. The Gigabyte board's Bios quoted bus speeds after the P4's 'quad-pumped' data rate technology had been applied, so the default was listed as 800MHz, rather than 200MHz, so I'd increase it by 40MHz at a time. I increased the bus to 840MHz and the system started fine, clocked at 3.78GHz (18 x 210MHz). Sysmark and 3Dmark05 scored 224 and 2,567 respectively and the DivX encode took 12 minutes, 55 seconds.

I then increased the bus to 880MHz, and again the system started up

without the need for increasing the core voltage. The processor was now overclocked by 10 per cent with a speed of 3.96GHz – faster than the Model 670, and close to the 4GHz mark. Now Sysmark and 3Dmark05 scored 234 and 2,569 respectively, with the DivX encode taking 12 minutes, 23 seconds.

Going too far

The next step was to try a bus speed of 920MHz, but the resulting overclock of 4.14GHz was too much for the system to even boot up. Increasing the core to 1.45 allowed it to boot, but it locked up as Windows loaded. With an extra half volt, Windows started, but wouldn't run any of the benchmarks.

Obviously I had pushed the processor further than it was capable of going with air cooling. I went back to a bus of 900MHz and a resulting clock speed of 4.05GHz. This time the system booted without a hitch, even with the default voltage of 1.4 and ran the benchmarks with no problems. Sysmark and 3Dmark05 scored 237 and 2,578 respectively, while the DivX encode came in at 12 minutes, five seconds.

Not huge differences over the previous scores, and perhaps some throttling was taking place, but it felt good to achieve a clock speed over 4GHz. Longer term I would probably leave this processor overclocked by 10 per cent to 3.96GHz, as this was comfortably below the maximum threshold and easily achieved with default voltages.

An alternative would be to implement the dynamic overclocking facility offered by other motherboards. These only apply the overclocking at times of high load and clock it back to normal during other times. This could give you the performance benefits of overclocking without the worry (and additional heat) of the processor always being in a pushed condition. **PCW**

Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

→ **Comments welcome on the Windows column.**
Email windows@pcw.co.uk
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Smoke and mirrors

Learn a trick with folder shortcuts; get the lowdown on DDE; and move to Thunderbird

When is a folder not a folder? And when is a shortcut not a shortcut? And if you think that's confusing, the answer depends on which version of Windows you are running.

Let's start with Windows 95 and 98. This is easy, as the trick we are about to reveal doesn't work here. So moving on to Windows ME and 2000, if you right-drag a folder into another folder, you get the option to move, copy or create a shortcut. If you do the last, then you end up with a yellow folder icon, with a small arrow bottom left, and the title 'Shortcut to folder'. If you've tweaked Windows so it doesn't put little arrows on shortcuts or use the 'Shortcut to…' prefix, then you'll get something different – but this is only cosmetic and does not affect the thrust of our argument.

Right-drag a folder onto the Start button and hold it there, then the Start menu will open. Taking care not to release the button prematurely and inadvertently drop the folder in the wrong place, keep dragging and you will find that you can drop it above the line on the top level, or navigate down through 'Programs' to another destination. When you release the mouse button, make sure you choose 'Create shortcut' rather than move or copy the files, or you will end up even more confused than I was. In case of accidental dropping or moving, remember that a right click in any folder or on the desktop reveals an 'Undo' command (see screen 1).

If you now click on the Start button and go to where you dropped the folder, you'll see an entry for 'Shortcut to folder'. But you will notice it behaves differently from a normal shortcut, in that when you single-click on it, a sub-menu of the contents of the target folder appears, and you can select individual
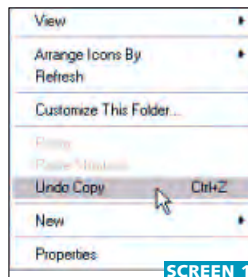

Left: A right click reveals an 'Undo copy' command

Below: A folder shortcut in ME…

SCREEN 1

SCREEN 2
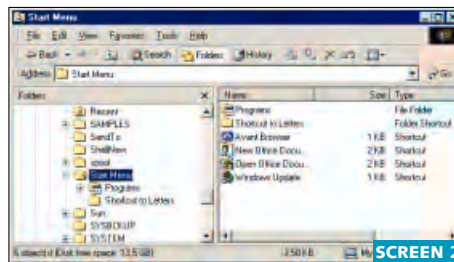
files or navigate down through subfolders. If you right-click on the Start button and choose 'Explore', things become even stranger. Your shortcuts appear as functioning folders; if you show folders in the left-hand pane of Explorer, you see the entire folder structure – it's as if you had copied or moved them there. But assuming you have not (I had accidentally copied the folders, the first time I tried this – hence the confusion mentioned earlier) then rest assured, it's all done with smoke

…is a folder in XP
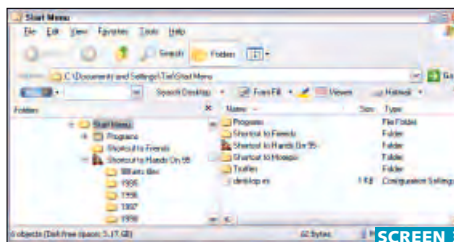
SCREEN 3

and mirrors. Look carefully and you'll see that these 'folders' are not the normal File Folder type, but Folder Shortcuts (see screen 2). In other words they are 'mirrors' of the target folder structure, rather like 'My Documents', 'My Pictures' and so on. The smoke that conceals this illusion consists of a Desktop.ini file – well known for possessing magic powers – and a Target.lnk file. If you look at the folders in File Manager (Start, Run, Winfile) or from a command prompt you'll be able to see these two files – but not the mirrored contents.

The XP way

Windows XP behaves in a slightly different way. If you are using the XP rather than Classic Start Menu, then any folder dragged above the line at the top level will be 'pinned' to the start menu, but not visible when you Explore from a right click on the Start menu. You'll need either to go down a level to 'All Programs' or use the Classic menu. Another difference is that the entities known as 'Folder Shortcuts' in ME and 2000 are here called 'Folders', but that's just smoke blowing in a different direction. For the sake of clarity we'll use the word 'mirror' to denote these entities (see screen 3).

Now comes the clever bit. Having created a mirror in the Start Menu folder, you can copy it elsewhere. It doesn't seem to make any difference, having right-dragged a mirror from the Start Menu folder, whether you Copy or Create Shortcut – in either case you get a new mirror in the chosen folder. You can, for example, create mirrors of distant folders in a folder on your desktop, or in the Quicklaunch toolbar. Or you can access remote folders and files from any location, without having to move them: it's a lot more elegant than plain shortcuts and integrates seamlessly into Explorer.

DDE anyone?

If you've ever visited the File Types tab in Folder Options, selected a file type, then clicked on 'Advanced' (Windows XP, 2000 and ME) or 'Edit' (95/98) you'll see a list of actions for that file type. If you then select an action and click the 'Edit' button, you'll often see something like screen 4. The top two boxes are straightforward enough, but what is all that DDE stuff about? If you click on the context help button, you'll find out that DDE stands for Dynamic Data Exchange, and that the four boxes are there to specify a command, application, command when the application is not running, and a topic. Which doesn't really tell us much, so here's a brief DDE backgrounder.

DDE goes back to pre-Windows 95 days, and is a way that programs can give each other commands or exchange data without using the clipboard. Usually this is done without user intervention but, as an example, the VBA macro-programming language in Microsoft Office can be used to make Word and Excel talk to each other. It has largely been superseded by other technologies, but it still works, is very simple, and there are only six commands. The DDEInitiate command, run from the current program (client) opens a channel of communication to the remote program (server), and can specify a data file on the server. DDETerminate closes the channel, and DDETerminateall closes all channels. Having established a channel, then DDERequest fetches data from the server – for example, to assign the contents of an Excel cell to a variable in a Word macro. DDEPoke does the converse, inserting a value into a cell
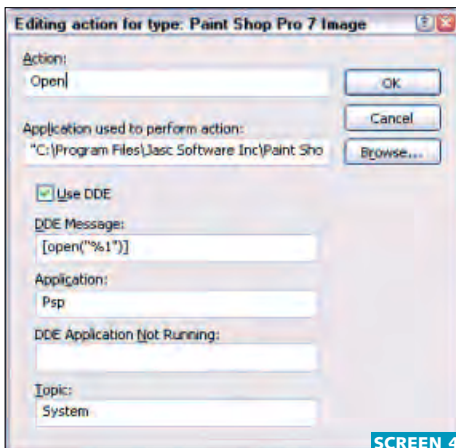
DDE allows programs to talk to each other

SCREEN 4

# Migrating from OE to Thunderbird

Last month, we promised you a blow-by-blow account of how to ditch Outlook Express and transfer your existing Outlook Express message and contacts folders to Mozilla Thunderbird. You'll find Thunderbird at www.mozilla.org/products/thunderbird and, like Firefox, it's free.

Before you install it, it's worth taking the time for some preparation. In Outlook Express, delete any messages you no longer want, then empty the deleted items folder. Next, go to File, Folder, Compact all folders. Finally, make backup copies of your message folders and address book. If you go to Tools, Options, Maintenance and click the Store Folder button, this will reveal where the former are stored – copy all the .dbx files to a backup folder (see screen 5). To back up your address book, you can make a copy of the .wab file, which will be in Application

Find your mail folders and make backups
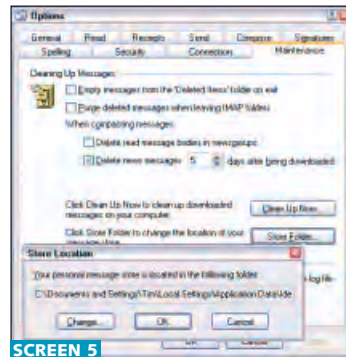
SCREEN 5
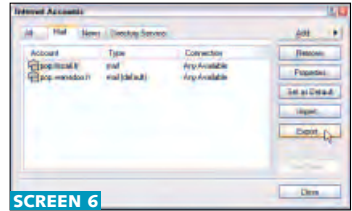
SCREEN 6

Back up your mail and newsgroup accounts

Data\Microsoft\Address Book. The Application Data folder will either be under Windows or under a user profile. A better way is to export the Address book to a text file, via File, Export, Address book. Finally, back up your mail and newsgroup accounts by going to Tools, Accounts, selecting each account in turn and clicking 'Export' (see screen 6). You will need a separate note of your mailbox passwords.

You can now close Outlook Express and install Thunderbird. We found this simple – a wizard sprang into action and imported the Outlook Express mail folders and address book (although you can bet we would have had problems if we hadn't made backups). The only glitches were that it didn't pick up a second mail account first time – though it did on the second time – and that we had a whole slew of messages at the 'most recent' end with dates of 06/02/2101. It turned out that these were all spam – sorry, newsletters – from Tiscali, which for some reason doesn't date its outgoing missives. It seems that Thunderbird had conjured up this strange date, which at least made it easy to select the lot and send them to the Trash folder.

on the server from Word. Finally DDEExecute sends a command to the server, such as creating a new file or running a macro.

Although there are better (and more secure) ways of getting Office components to talk among themselves, DDE is still at the heart of Windows, as we see in the file type settings. Although it all looks rather complicated, it is in fact simple. In this case, Windows is the client, and the program specified in the 'Application' box (or, if this is empty, the 'Application used…' box) is the client (see screen 4). The 'Topic' is the equivalent of the data file name in the Word/Excel example above, and in this case it will always be the 'System' topic. That leaves just two boxes – one for the DDE command to be executed, and another for the DDE command to be executed should the server not be

running. You can string DDE commands together – so, in the latter case, to take the context help example, if you wanted to print a file from the Explorer right-click menu you could launch the server application, open the selected file, print it and close the server by specifying:

`[open(“%1”)][print()][quit()]`

This assumes that the server understands those commands – unfortunately there is no universal set of commands or syntax, so whereas the command to print a Word document is:

`[REM _DDE_Minimize][FileOpen↵`
`(“%1”)][t=IsDocumentDirty()]↵`
`[FilePrint O][SetDocument↵`
`Dirty t][DocClose]`

(Key: ↵ code string continues)

the corresponding Wordperfect command is:

`FileOpen(“%1”) PrintFullDoc() ↵`
`CloseNoSave(1)` **PCW**

Barry Shilliday has worked with computers for almost two decades. By day, he is a Linux and Unix consultant, but in his free time he prefers to travel the world – and snap it with his camera.

→ Comments welcome on the Linux/Unix column.
Email linux@pcw.co.uk
*Please do not send unsolicited file attachments.*

Fire up Firefox

The Mozilla web browser is rapidly gaining popularity. Here's what you need to know

Linux users have a good choice when it comes to web browsers. While the names of the programs may differ, under the surface there are quite a few similarities, as most of the work is done by the HTML rendering engine. There are two major open-source rendering engines available: Gecko and KHTML. The latter is used by KDE's Konqueror and Apple's Safari browsers, and the former by the Mozilla browsers. Mozilla Firefox, the most widely used, has grown immensely in popularity over the past year, and this month we will take a look at it.

When Netscape became open source, the Netscape code was released to the world. From that came the Mozilla suite, which provides a web browser, an email and news application and an HTML editor. While certainly sturdy and reliable, it was losing the battle with Microsoft's Internet Explorer and moving into insignificance beyond the open-source world. Everything changed when Mozilla Firefox was released. The web browser code and the Gecko engine were taken from the Mozilla suite, developed and released as a separate application, designed much more towards the modern desktop user. As open-source code, it's free to distribute and modify, and comes unrestricted on Linux, OSX and Windows. Now, Mozilla Firefox has an estimated 10 per cent of the entire web browser market across the world – significantly higher in more developed countries.

Firefox (as it's generally known) has a list of features that has drawn millions of users to it: tabbed browsing, a pop-up blocker and the ability to use extensions, to name just a few. Its cross-platform development makes it ideal for people who use several systems, as the configuration files are portable between different
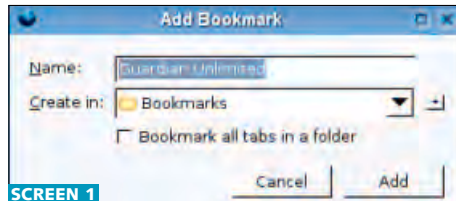
SCREEN 1

operating systems, and the independence from any one system makes it much more resilient in terms of security. Firefox on any platform should look and behave more or less the same, save for the native GUI's overall look.

All recent Linux distributions come with Firefox installed, and it is generally the standard browser. Some older ones may provide the Mozilla suite instead. There are pre-built binaries available for download from the website at www.mozilla.org/products/firefox. At the time of writing, version 1.5 was in beta, but may well be available when you read this.
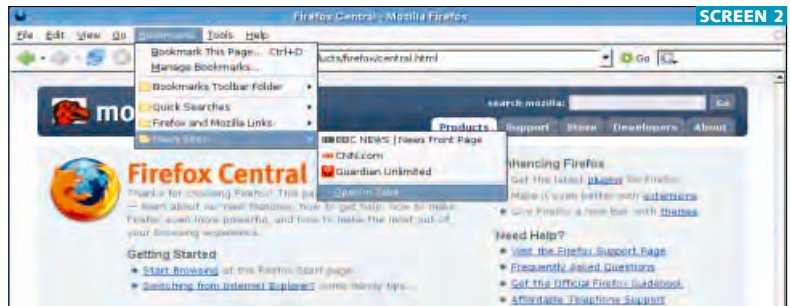
Firefox tabs
It has been said that if you don't like tabbed browsing you really don't know how to use it. A surprising number of Firefox users don't know of its existence, or have never thought

Bookmark all tabs together in one folder

Open up a folder of bookmarks simultaneously into tabs

about how it could be useful. Tabbed browsing lets you browse more than one website (or different parts of the same website) using just one window. Using tabs not only reduces screen clutter, but also helps arrange things logically. For example, if you regularly access several online DVD sites to compare prices, you could have a single window open with each site in a tab; comparing different pages using tabs is immensely easy compared to minimising and maximising windows while trying to line them up. Furthermore, it's possible to open a group of sites in a bookmark into tabs automatically – again, very useful for sites you visit regularly.

To open a new tab press Ctrl & T or File/New Tab from the menu. By default Firefox will only display the tab bar if more than one tab is open. Once the tab bar is displayed, double-clicking on an empty area will also open a new tab. Clicking each tab using the mouse is the usual way of selecting the one you want, but a quicker way is to use the keyboard: press Alt & 1 to select the first tab from the left, or Alt & 3 to select the third (for OSX and Windows you must use Ctrl instead of Alt). An alternative is to switch tabs cyclically; to do this press Ctrl & Page Up to cycle left and Page Down to go right.
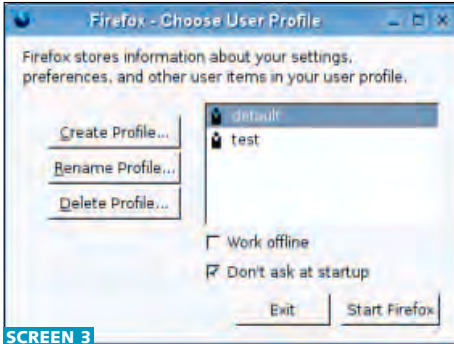
SCREEN 2

Use Firefox's profile manager to create and rename profiles

SCREEN 3

Firefox shortcuts

Ctrl & T	Open a new tab
Ctrl & W	Close active tab
Alt & 2	Select second tab
Ctrl & PgUp	Cycle tabs left
Ctrl & PgDn	Cycle tabs right
Ctrl & left click	Open link in a new tab
Middle click	Open link in a new tab
Shift & left click	Open link in a new window
Ctrl & +/-	Increase/decrease font size
Ctrl & scroll wheel	Increase/decrease font size
Ctrl & F	Find and highlight text

There are a few ways to close a tab. Click on the small cross on the right-hand side of the tab bar. This closes the currently displayed tab. Right-click on any tab and select 'close tab'. Alternatively press Ctrl & W to close the current tab. If only one tab is displayed this method will close down the browser altogether.

Using bookmarks with tabs is easy too. Let's say we visit several news sites regularly (for example BBC News, CNN and *The Guardian*). Open up each site into a tab using the normal method, then press Ctrl & D or 'Bookmark This Page' from the

'It has been said that if you don't like tabbed browsing you really don't know how to use it'

menu. A window similar to screen 1 pops up. As we were on *The Guardian*'s website, its title is the default name. This isn't much use for a news group, so change it to something more appropriate (for example, 'News sites'). Next just click on the 'Bookmark all tabs in a folder' option and add the bookmark. Now a new folder is created with each of the open tabs bookmarked inside. To open all the sites into tabs, open a new browser window, select the bookmark folder from the menu and choose 'Open in Tabs' (see screen 2).

Extending Firefox

A powerful feature Firefox offers is its extensions. The Firefox developers wanted to include a limited number of features – those that would appeal to as many users as possible. Adding too many would mean cluttered menus or confusing configuration windows. To allow for extra features, Firefox supports these

extensions. They can change Firefox's existing behaviour or add completely new things. To get to the central page for extensions, go to the Firefox homepage and select 'Get Extensions and Themes'. These downloads are generally operating-system independent, so will work on any platform. Installing an extension couldn't be much easier: click on the button on the page and restart the browser.

One popular extension is 'Adblock'. This has its own website at http://adblock.mozdev.org. Adblock, as its name implies, is designed primarily to block adverts in Firefox. Right-click on any advert to block an individual one or enter the Adblock preferences to block based on a pattern: '*doubleclick.net*', for example. Adblock does a good job of detecting many adverts and adds a convenient 'Adblock' tab to the image. In addition to adverts, Adblock can block any arbitrary image, so might be useful in removing distracting images from sites you use. The extension adds its own settings menu under the main 'Tools' menu.

Google has now released its toolbar for Firefox. Head to http://toolbar.

All of Firefox's settings can be changed through this interface

SCREEN 4

google.com/firefox/index.html for a copy. The Google toolbar includes a few useful features such as spellchecking, a tool to translate words into other languages, a page rank indicator (for searches) and an auto-complete suggestion for Google searches.

File layout

Firefox manages its configuration files using profiles. A profile is quite simply a separate directory for all the settings, extensions, caches, cookies, passwords, and so on. It means that any particular user can have any number of profiles that are unrelated to each other and can have completely different setups. Generally speaking, most people only use one profile, although there are a number of reasons to use more than one, such as testing or maintaining different settings and cookies for certain sites. We'll see more on additional profiles later.

When running Firefox for the first time it creates a default profile and the basic directory structure. All profiles are stored in the user's home in the '.mozilla' directory, under a subdirectory of 'firefox'. The profile name is then used to create the profile directory. This consists of a randomly generated string, followed by the profile's name. For example, the complete structure could be '.mozilla/firefox/tpa4k8kx.default' – remember that the initial profile is the default, and is called 'default', too. The reason for the random string is additional security; having unauthorised access to password files and other private data is something you'll want to avoid, and using a random string helps to protect those files (see screen 3).

Inside the profile directory you can find all of Firefox's environment. Some files are in text format and

↗
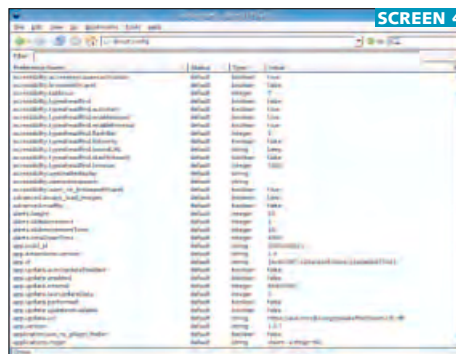
Profile backups for power users

How to create an archive or copy individual files, and some advice on managing the information

There are a couple of alternatives for backing up settings or profiles. As we've seen, all profile information is stored in a single directory; that way multiple profiles will never have any effect over each other. A simple method to back up all your profiles and settings is to archive the entire structure. It's a good idea to clear out the cache before doing so, as this can be several megabytes in size. Do this by erasing the cache directory, or through the preferences tool in the browser. To create an archive, go into your home directory and enter:

`$ tar cfvj firefox.tar.bz .mozilla`

This command creates a compressed archive of all the files associated with Firefox. You can use this archive to restore your settings at a later point, or to move your settings to another system. For example, to extract all the files onto a new computer, enter the home directory, copy across the archive and run:

`$ tar xfvj firefox.tar.bz`

If you are restoring files from a previous backup, it may be worth erasing the Mozilla directory and all its contents before extracting the archive. Make sure your backup is valid before doing this, as there's no way to get the files back otherwise. Alternatively rename the Mozilla directory to keep the files available. Run either of the following commands before extracting the backup using tar as above:

`$ mv .mozilla .mozilla.old`
`$ rm -r .mozilla`

If you don't want to back up, restore or copy your entire profile, it's possible to copy individual files instead. As we've seen, the profile directory contains several files
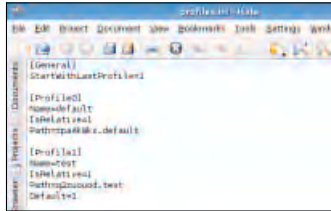
Edit the profiles.ini file for troubleshooting

for various aspects of Firefox's configuration. If you just wanted to keep your bookmarks and saved passwords for a clean new setup, the easiest way is to start Firefox as usual and allow it to create a default profile, exit the browser, and then copy across the bookmarks.html and signons.txt files to the new directory. For example, we have stored these two files in the home directory and want to overwrite Firefox's newly generated versions:

`$ cp -a bookmarks.html ⤦`
`.mozilla/firefox/sj83kius.default/`
`$ cp -a signons.txt ⤦`
`.mozilla/firefox/sj83kius.default/`
(Key: ⤦ code string continues)

The -a option ensures that the file permissions are maintained. The profile directory will vary in reality due to the random part of the name.

Profile management

Should you want to have more than one profile, Firefox provides a simple way to set one up. When Firefox is first run it will check for a default profile to use, and will automatically create one if it doesn't exist.

After that Firefox will start the default profile every time it's launched. In order to create a new profile, a special option must be given at the command line:

`$ firefox -profilemanager`

This brings up a window. All profiles are listed here; initially there will be just the default profile. Hit 'Create Profile' to create a new one – all that needs to be given is the name of the new profile. Select the profile you want to use and then run 'Start Firefox'. The selected profile becomes the default, so as long as 'Don't ask at startup' is ticked, Firefox will use this profile without asking each time.

In addition to the built-in manager, you can manage this information manually. In the .mozilla/firefox directory is the file profiles.ini (see screen). Each profile is listed sequentially with its name and directory path. In the screen example, the second profile 'test' is selected as the default. Modifying the file will have the same effect as using Firefox's profile manager option, though the latter is evidently easier. It can, however, be useful to know how the profiles are configured in case of troubleshooting; if this file becomes corrupt or lost, it's a relatively simple task to fix it.

All the information in the profiles, as well as the structure itself, is portable between operating systems. You can transfer the files to another operating system as long as they're stored in the right place. OSX, for example, stores the profiles in Library/Application Support/Firefox instead of .mozilla/firefox. Windows keeps its files in Documents and Settings\userid\Application Data\Mozilla\Firefox.

others in binary. It's not usually a good idea to go in and edit the text files directly, although it can be done. There are several files of interest: bookmarks.html is the file containing all the bookmarks; cookies.txt contains all stored cookies; history.dat is a binary file containing the URL history; signons.txt holds encrypted stored passwords; and the cache directory contains a series of directories holding the browser cache files. A particularly important file is 'prefs.js'. This is where all the browser settings are stored. Firefox has a large list of settings, all of which have defaults. Any settings that are changed are stored in this file. It's in

plain text and can be edited, but will be overwritten if Firefox is running, since it keeps a copy in memory. Most extensions also store their settings in this file.

Changing configuration settings is best done using Firefox's own interfaces – the preferences interface and settings editor. The preferences GUI allows easy access to most of the important settings; this is really just a front end to the settings editor. To access the editor, enter 'about:config' in the URL bar (see screen 4). Settings can be changed while Firefox is running. Double-click on any setting to bring up a dialogue window or toggle a Boolean value. New settings are added

by right-clicking in the window and selecting the type (integer, string, Boolean); this is for advanced usage only. Any changes from the default are highlighted in bold to make them easy to find.

A setting you are often recommended to change is 'network.http.pipelining'. This allows Firefox to download more than one thing at a time, and can help speed up page loading. Scroll down to the relevant entry and double-click on the setting. It will change from 'default Boolean false' to 'user set Boolean true'. The change is immediate, but won't be written to the prefs.js file until Firefox exits. **PCW**

Ken McMahon is a freelance journalist and graphic designer. His involvement with digital cameras began with a Commodore 64. He graduated to Macs and now works mostly with PCs.

→ **Comments welcome on the Digital imaging & video column.** Email digitalimaging@pcw.co.uk *Please do not send unsolicited file attachments.*

Take your photos with you

Portable hard disk-based devices mean storing images while you're travelling is easy

Flash memory cards are getting bigger and 1GB cards are no longer considered unusual, but camera sensors are keeping pace and if you choose to shoot raw or uncompressed and bracketed exposures, or shoot in continuous mode, you'll have no trouble filling them up pretty quickly.

You can equip yourself with several cards but, even with 1GB CF (Compact Flash) cards selling for as little as £50, it could get expensive. And what if you're planning a trip of several days or weeks and intend to do lots of shooting?

The answer could lie in a portable hard disk-based storage unit. There are several options to choose from and I've been trying out four. The requirements I set for these devices were that they must offer at least 20GB of storage and be capable of providing a colour preview of downloaded images.

In the event, the Epson P2000, Vosonic XS-Drive Super, Smartdisk Flashtrax XT and Apple's Ipod all turned out to be very different. The Epson is built to last, has a top-quality screen and, though not the fastest, is well suited to professional use. The Flashtrax XT is a multimedia powerhouse offering playback of a wide range of video formats including DivX, while the XS-Drive Super offers value for money, multiple card slots and basic functionality. And the Ipod is, well, it's an Ipod.

Epson P2000

The P2000 was launched just over a year ago. It's a sturdy, handsome device with a fantastically bright and clear 3.8in colour TFT LCD, a 40GB hard drive and slots for CF and SD (Secure Digital) cards. You can read other cards with an optional adapter.

The first thing to say about the P2000 is that it's very simple to use.

Without so much as a glance in the direction of the manual, within five minutes I had experimented with every function available including browsing, slideshows, movie playback and changing the default settings. All navigation is carried out using a four-position thumbwheel supplemented by four buttons for printing, menus, display functions and the Home page.

Two of the main criticisms of the P2000 when it was launched were that it had an 8.9megapixel limit on the size of jpegs and its support for camera raw formats was limited to just a few models. Epson addressed both of these issues with a firmware upgrade in April 2005 which increased the jpeg size to 17.8megapixels and broadened raw support to include Konica Minolta, Pentax and Epson models. Epson also improved the display of Exif data and added a histogram function.

Downloading images from cards couldn't be more straightforward; you just load the card in the slot, select the memory card icon on the Home page and choose the copy option from the short menu. Images are stored in their original folder locations within a date-stamped container folder. A new folder is created for each day you download a card. Browsing could be quicker; it takes several seconds for the

Simple to use and great to look at, Epson's P2000 won't disappoint

The XS-Drive Super VP6210 from Vosonic can read many different card formats

P2000 to display a page of 12 thumbnails and, though it caches viewed pages, it doesn't cache the rest of a folder, so on the first viewing you have to wait a while for each page to display.

That criticism aside this is a terrific piece of kit that won't disappoint even demanding pros. Also worth looking at is the 80GB P4000 which was announced as we went to press.

Vosonic XS-Drive Super VP6210

The XS-Drive Super is available in 20, 40 and 80GB sizes. It's about the same size as the Epson P2000 but weighs a little less and doesn't feel as solidly constructed. It's positively bristling with card slots though, making it a good choice if you carry around several cameras that use different formats.

The drive can be held in one hand, though if you use both, holding it in portrait format you can use both thumbs, phone-style to access the controls beneath the 2in colour LCD screen. The XS-Drive's interface is basic but functional, and would be easier to use if the distracting wallpaper image behind the icons wasn't there.

When you plug in a card it appears on the desktop and selecting it and pressing the menu buttons gives you the option of backing it up. You can chose to back up the entire contents of a card or just the photos – useful if you use cards for things other than pictures. Rather than maintaining the original folder setup, Photo Backup copies all images into one folder prefixed with the original folder name, eg 101_0113.jpg.

Response when browsing is fast, you can view a folder in either list or icon mode, but there are no thumbnails.

Scrolling through images in full-screen mode happens instantaneously.

The XS-Drive offers two download speeds: normal and high, both for card reading and PC transfer. The 'disk data may be corrupted' warning that appears when you select high-speed mode doesn't exactly inspire confidence, but it did skim one minute, 19 seconds off the read time for 931MB of data with no ill effects. Downloading data to the PC using high-speed mode was no quicker than normal.

The 2in LCD screen isn't much of an improvement on most camera LCD panels and the lack of support for file formats other than jpeg is a drawback, but the XS-Drive Super is nonetheless a good option if you're looking for affordable storage with a wide range of supported card formats.

Smartdisk Flashtrax XT

The Flashtrax XT is much more of a portable media centre than the other devices. The others will play back audio and (Ipod excepted) video, but the Flashtrax supports a wider range of formats, can capture audio and video from plugged-in devices (such as a TV) and has a built-in FM radio.

It also looks different, with a pop-up screen and dedicated buttons for recording and playback, it closely resembles a personal DVD player. The operating system is navigated using a cursor pad and buttons which are revealed when you flip up the screen.

To view files you select Photo mode and are then given the option of selecting either the hard disk or a CF card – even when no card is inserted, which isn't particularly intelligent. Images downloaded from a card are

stored in a 'CF Files' folder, followed by a date-stamped folder with the original folder hierarchy from the card maintained. When you get to a folder containing images, the file list is displayed on the left and a preview thumbnail of the currently selected image appears on the right. It takes a couple of seconds for a thumbnail to display, which makes the process of scanning quite laborious. If you select an image to display full screen you can use the cursor pad to scroll through a folder and, as this happens at the same speed, it's probably the best approach.

A copy button next to the CF card slot makes transferring data to the Flashtrax so simple that, having managed it unintentionally, I found there was no way to cancel it. This did show one of Flashtrax's strengths however; you can't turn it off during a copy operation.

If you're looking for portable storage alone, the Flashtrax isn't for you. But if you like the idea of having a portable PVR and media player in your camera bag, then this could be worth considering.
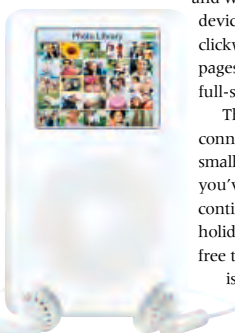
Apple Ipod

In June 2005 Apple integrated the features of its Ipod photo into the standard Ipod range. Apart from the Ipod Mini (now discontinued), Shuffle and the new Nano, the range now consists of 20GB and 60GB models both with

Smartdisk's Flashtrax can capture audio and video, and has an FM radio

Access your images without delay with the Apple Ipod

colour screens and the ability to store and display photos. With an Ipod Camera Connector you can hook up a digital camera or card reader to your Ipod and download the images. For a list of supported devices go to www.apple.com/support/ipod/photos.

The big disappointment with the Ipod was the speed at which photos were downloaded. Obviously this is dependent on the camera connector, which in many cases is going to be USB 1.1. But even with a USB2 device connected, download times were lengthy and getting on for an hour for the 1GB test card. The Ipod is clearly capable of faster file transfers, so it seems this is down to on-the-fly image processing rather than bandwidth limitations.

In every other respect the Ipod is a joy to use. It may be slow, but during download you get plenty of feedback on progress with total number of images and number downloaded indicated on screen, as well as options to cancel or stop and save.

Once the photos are in the Ipod, navigating and viewing is lightning fast and way superior to even dedicated devices such as the P2000. Using the clickwheel you can navigate through pages containing 25 thumbnails or full-screen images with no delay.

The slowness of the Ipod's camera connection rules it out for all but the smallest of cards in situations where you've only got one and you need to continue shooting. But if you're on holiday and want to transfer shots to free the card for use it wouldn't be an issue. Added to which you've got arguably the world's favourite music player thrown in. **PCW**

HD storage devices

MANUFACTURER	EPSON	VOSONIC	SMARTDISK	APPLE
Model	P2000	XS-Drive Super VP6210	Flashtrax XT	Ipod
Price inc VAT (ex VAT)	£309.99 (£263.82)	£219 (£186.38)	£299.99 (£255.31)	£209 (£177.87) Camera connector £19
URL	www.epson.co.uk	www.cardmedia.co.uk	www.smartdisk.com	www.apple.com
Hard disk size	40GB	20GB	40GB	20GB
Card slots	Compact Flash I/II (and Microdrive), SD/MMC	Compact Flash I/II (and Microdrive), Smartmedia, Memory Stick, SD, MMC	Compact Flash I/II	Ipod camera connector
Ports	USB2, AV out, headphones, DC in	USB2, AV out, headphones, DC in	USB2, Comp video-in, Comp video-out, headphones	Ipod camera connector (USB)
LCD size	3.8in (640 x 480)	2in	3.6in	2in
Battery	Li-Ion 3.7v 2,300mAh	Li-Ion 3.7v 1,800mAh	Li-Ion	Li-Ion
Still file formats	jpeg, raw	jpeg	jpeg, bmp, gif, raw	jpeg, bmp, gif, tiff, png, psd (Mac)
Movie file formats	mpeg4 (avi and mov), m-jpeg, (avi and mov), mp4, asf	mpeg1, m-jpeg (avi and mov)	asf, avi, mpeg4, mov, DivX, xvid	N/A
Audio file formats	mp3, aac	mp3 wma, audio CD, wav (MS-riff)	mp3, wma	aac, mp3, wav, aiff
Size (w x h x d) (mm)	147 x 84 x 31.4	86 x 135 x 35	158 x 97 x 35	61 x 104 x 1.6
Weight	415g	332g	427g	167g
Time to read 1GB Compact Flash with 931MB of data	7 minutes, 16 seconds	5 minutes, 10 seconds	6 minutes, 37 seconds	52 minutes, 34 seconds (from USB2-equipped camera)
Write to PC via USB2	53 seconds	1 minute, 53 seconds	1 minute, 23 seconds	1 minute, 36 seconds

Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

→ **Comments welcome on the Word processing column.**
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Heading up a footer inquiry

Using a field enables you to satisfy some unusual page layout requirements

Headers and footers are an integral part of word processing. As the name suggests, they appear at the top or bottom of the page and are independent of the main flow of text. They can be used to contain static or changing information, as well as all sorts of other uses. Any word processor worthy of the name (not Wordpad) will let you have a different first page, for a letterhead, for instance, or left and right pages for title or chapter page numbering, to give just two examples.

When used in conjunction with fields in Word headers and footers become more versatile. You may have read before in this column of the Cix Word for Windows conference (www.cix.co.uk), where users have been discussing Winword since version one. This month, they were presented with a real-world problem. Someone wanted to produce a template with a header just on the first page and a footer just on the last. The documents themselves would be a variable number of pages long. The idea is that anyone can create a document using the table and have the first and last page header and footer in place without having to do anything other than type the intervening text.

The first part is easy – different first page header, with nothing in the header of subsequent pages. The last-page-only footer was the real challenge. One rather lateral suggestion was to use an endnote, which would always appear at the end of the document. This had two flaws – first, endnotes don't appear at the bottom of the last page but after the last paragraph on the last page. Second, an endnote needs to be attached to a reference in the body of the text, which could be deleted. The winning suggestion was the use of a field in the non-first-page footer to check if this was the last page and then to insert text.
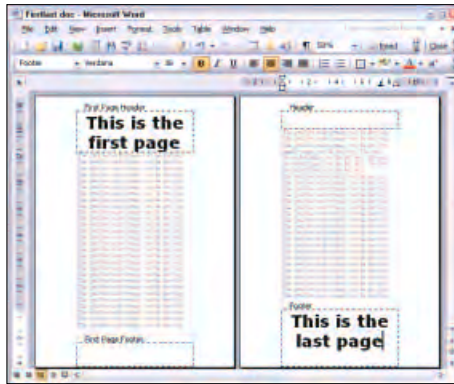
Getting a different footer on the last page is a challenge

So in both the first-page footer and the non-first-page footer you need to insert the following nested fields:
```
{IF {PAGE} = {NUMPAGES} ↵
"This text only appears on the ↵
last page"}
```
(Key: ↵ code string continues)

You don't physically need to type those curly brackets – you get an empty field by holding down the Control key and pressing F9. You can type the contents of the fields and the equals sign normally. If, with the field selected, you hold down the Alt key and press F9, you can toggle between seeing the field code and its results. An unmodified F9 will update a field.

If you are trying this out you may have hit a problem. Even if you set

'Different first page' for headers and footers in Page Setup, you can't move to the next footer in the template. The trick here is to put a page break in the body of the template to get a second page. You'll then be able to get at the non-first-page header and footer.

Having set up the headers and footers, delete the page break. Your document template will revert to a single page but it will remember the headers and footers. Make sure you Alt & F9 to show results rather than codes before you save the template, or the user will also see codes. Finally, make sure 'Update fields' is checked in Tools, Options, Print and the whole thing should be bullet-proof (see screen).

A new look for Office 12
The first beta version of Office 12 is scheduled for early in 2006 and Word is due for a major shake-up. XML will become the default file format for all documents and there will be major changes to the interface.

According to Microsoft this 'will present a streamlined, uncluttered workspace that minimizes distraction'. The new interface has graphical command tabs rather than the toolbars. Having seen the screenshot from the Microsoft Office website, I'm not so sure about the 'minimizes distraction' bit – existing users will be in for a richly curvaceous relearning process. **PCW**

Mini solutions to a macro challenge

In November's Question time we mentioned a macro to open the last Word document you were working on and, in the Windows column, we showed you how to run this from a shortcut. Reader Andrew Hirst has pointed out an easier way – a shortcut to winword.exe with the switch /mfile1. Alan Cruttenden improves on our macro with one that will avoid an error message if the

last file has been moved and will return the cursor to the last editing point. Here it is:
```
Public Sub Restore()
On Error GoTo ErrLab
RecentFiles(1).Open
Application.GoBack
ErrLab:
End Sub
```

Stephen Wells is a freelance journalist and a regular contributor to computer magazines. He's been writing PCW's Spreadsheets column for over 10 years.

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Grand openings

## Customising functions in Excel workbooks is simple – just follow these tips

Two readers have requested help on having customised openings in Excel workbooks. John Molden has two printers connected to his PC and wants to see two Print buttons on the Standard toolbar, one for each printer. Hitesh Patel wants to see the day and date at the top of each new file in a format such as Monday 2/1/06.

First let's tackle Hitesh's request. Normally when you open Excel a file called Book1 is displayed. Make your entries then save this file with a new name. To make the changes global, you need to save the file in the right place. Hitesh could open Excel to display Book1 then enter =TODAY() in cell A1 to display today's date, and custom format the cell, then save the file with another name in the XLSTART folder.

To format the cell, choose Cells on the Format menu, then Custom under Category, and in the Type box enter ddd d/m/yy. This will display the current date in the format Monday 2/1/06 in cell A1. You could have the date show in cell A1 of every worksheet in the workbook by holding down Shift and clicking on the first and last worksheet tabs before entering =TODAY() in the first worksheet's cell A1. Save this file with a new name, such as MyFile, in the XLSTART folder using this default path: C:\Documents and Settings\[username]\Application Data\Microsoft\Excel\XLSTART.

Close Excel. When you open it again, instead of seeing Book1, you'll see MyFile and the date will be displayed just as you have ordered it.

Just as you can make entries in Book1 then save the file with a new name, you can do the same thing with MyFile. Any new file will display the current day when you open or re-open it. Or you can create a Custom Function that will always show the new file's creation date. Press Alt & F11 in your

A second Print tool button can start an alternative printer
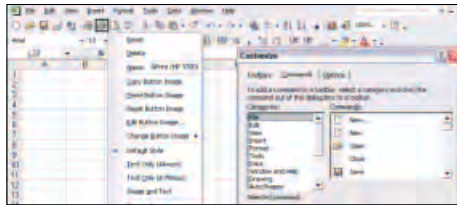
MyFile workbook. On the VBA Editor Insert menu, choose Module and type:

```
Function Created()
Created = ActiveWorkbook.↙
BuiltinDocument↙
Properties.Item(11)
End Function
```
(Key: ↙ code string continues)

Then, in cell A1, enter =Created() and save the MyFile workbook in the XLSTART folder. This new Custom function will then be available in any new or existing workbook you open. It will be listed in the User Defined category of available functions.

On the button

If two printers are connected to your PC you can set the one to be activated by the Print button by selecting Start/Control Panel/Printers and Faxes, right-clicking on your preferred printer and choosing Set as Default Printer. Back on a worksheet, if you hover over the Print button, a tooltip will display the name of that printer.

John Molden has an HP2300 monochrome printer and an HP3700 colour printer connected. Let's say the HP2300 is set as the default printer.

You first need a short macro. Open a new workbook and give it a name such as MyFile.xls or Macros.xls and save it in the XLSTART folder as described above. Press Alt & F11 to start the VBA editor. On the Insert menu choose Module and enter this code in the right-hand panel:

```
Sub ChangePrinter()
```

```
    Application.ActivePrinter ↙
= "HP 3700 on LPT1:"
    ActiveWindow.Selected↙
Sheets.PrintOut Copies:=1, ↙
ActivePrinter:= _
        "HP 3700 on LPT1:", ↙
Collate:=True
End Sub
```

Here, the default HP2300 printer is connected to a USB port and the HP3700 to LPT1. If you temporarily change the default printer in Control Panel, then display your macro and press F8, you can point to the second line of code and the names for the active printer and its port will be shown in a tooltip. Then switch back to the correct default printer. Save and close this file.

It doesn't matter which file you add the new button in, as the revised version of the toolbar will be held in a special file with a name such as Excel.xlb or Excel10.xlb, depending on which version of Excel you are using.

On the far right-hand side of the Standard toolbar is a dropdown arrow that displays the tooltip, Toolbar Options. Choose Add or Remove Buttons, Customize. This opens the Customize dialogue box. When you want to make changes to the tool buttons, keep this dialogue box open.

In the Commands box, under the Commands tab, find the Print tool button and drag it up onto the Standard toolbar next to the existing Print button. Right-click on the new button and choose Assign Macro. In the 'Macros in:' box choose Macros.xls, if that's where you put your macro. In the 'Macro name:' box enter ChangePrinter.

With the Customize dialogue box still open, right-click on the new button again and where it says Name: &Print change it to read &Print (HP3700) (see screen). Close the dialogue box. Now the first Print button will print your file with the HP2300 printer and the second button with the HP3700 printer. **PCW**

Nigel Whitfield edited computer magazines before going freelance in 1995. A specialist in Internet and consumer issues, he has a degree in Computing Science from Imperial College.

→ Comments welcome on the Web development column. It returns in the March issue. Email webdev@pcw.co.uk *Please do not send unsolicited file attachments.*

Getting in the mode

## Make your site accessible for mobile phones with a little help from I-mode

The web on mobile phones is something that's long been considered to have failed to live up to its promise; a large part of that could be blamed on the phone networks that told us we could have the Internet on our phone at a time when the web was becoming increasingly rich with fancy media, and the first Wap phones were low-resolution monochrome affairs.

It's hardly surprising that people were disappointed. But modern phones tend to have better screens, full colour and are significantly larger or, if not, at least have better resolution and more capable browsers.

One of the tools that's been making a buzz for a while in Japan, and in some parts of Europe, is I-mode. It's an alternative to Wap which has proven to be pretty popular and – finally – it looks like there should be I-mode handsets available in the UK by the time you read this.

So, what is I-mode, and why would you use it instead of Wap? Both are fairly similar to HTML, in that they're descriptive languages used for your pages and, being XML-based, they can look quite similar. But while Wap uses a language called WML, I-mode relies on cHTML or compact HTML. Essentially, it's a subset of HTML, with some additional attributes that make it useful for mobile phones and it's pretty close to XHTML Mobile Profile (MP) too.

Wap, by contrast, has a very different structure from an ordinary web page, with the concept of a deck of cards, with information capable of being passed between the cards, as well as to and from the server. While that offers some useful benefits, you may need to re-think the way that your website works. And, since you have to serve .wml pages to mobile phones, you'll also need to configure the web server appropriately, which

SCREEN 1
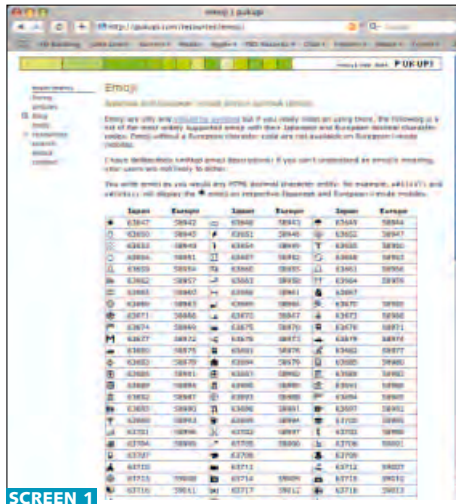
means if you just want to add a bit of mobile phone compatibility to a personal site hosted by your ISP, it may not be quite as easy to do.

CHTML is much closer to an ordinary site, and you can simply add some of the extra attributes to an existing web page if you like, to make it work better on an I-mode handset. You could also create a custom I-mode-compatible page on your site, using cHTML; it'll render OK in most standard desktop browsers too.

Basic cHTML

At the time of writing, it wasn't clear which handsets would be available with I-mode in the UK, though there should be quite a few, encompassing both GPRS and 3G services. So, what do you need to do to make a page that's acceptable to them?

At it's very simplest, an I-mode page can look something like this:

```
<html>
<head><title>Nigel's iMode ↵
```

As well as an I-mode emulator, Pukupi.com has a handy table of Emoji icons and their code numbers

```
test page</title>
</head>
<body>
<p>Welcome to iMode</p>
</body>
</html>
```

(Key: ↵ code string continues)

So, nothing too new there, then. There are some limitations you should bear in mind – for example, first-generation handsets could only support gifs, rather than jpegs. It's annoying, but at least you don't have to convert everything to Wap bitmaps instead – and I'd be surprised if the UK crop of handsets don't support jpeg at all, so it's worth experimenting.

Of course, making your images small – around 120 pixels wide, at most – is good practice, to avoid sideways scrolling on a small mobile screen. But the areas where you can make things much easier for users are in navigation and data entry, and in integration with the phone features, all things that I-mode offers via cHTML tag attributes.

Navigation first, and here it's straightforward; form fields and links on a page can all be assigned a shortcut key, which will take you straight to that option; for a link it should activate the link, while for a form field, it will take you straight there. So you can present a numbered list of links and people just need to press the appropriate one. It's done like this:

```
<a href="http://www.pcw.co.uk↵
/" accesskey="1">PCW home ↵
page</a>
<a href="http://news.↵
bbc.co.uk/text_only.stm" ↵
accesskey="2">↵
BBC News (text version)</a>
```

How does a visitor know which keys they should press for which link? Well, you could add graphics or you could put a number next to each link –

Beyond cHTML

The examples here use cHTML, which is a little long in the tooth. There are a lot of handsets that support it; but it's not the only way of doing these things over the web. If you're serious about making web pages that are compatible with lots of mobile devices, you should also be looking at XHTML MP. Even Wap 2 isn't as nasty as the original version and it supports CSS, so you can load in different stylesheets to help get the best effect on different phones.

You might be surprised by how much you can do without a special I-mode phone, coding in WML or spending ages reading up on XHTML MP. For example, while testing the basic pages for this column, we pointed a Nokia 6230 at the same files and it displayed them without any problems. The accesskeys attribute didn't give one-button shortcuts to the links, but if you press Options when looking at a page and for each link to which you assigned an accesskey, there'll be an entry in the Shortcuts list. And the telbook and email attributes are correctly detected, so if you choose Save to Contacts from the Options menu, you'll find the name, email address and phone number all correctly filled in for you.

though it might not be obvious. Or you could use an Emoji icon.

Emojis are icons that are provided by the I-mode browser; they're extended characters and have a big advantage. They're standard, so people will be used to seeing them on other sites and, since they're built into the handset, you're not forcing people to download images that boost their data consumption, putting up the costs.

Many, of course, are irredeemably naff, but it's useful to have symbols that people should recognise for 'Press the 1 button'. You add an Emoji icon by quoting its character number; the number keys, from 1 to 0 are characters 59106 to 59115, so the icon for 3 would be displayed by using the code
``

There are various sources of information about Emojis on the net; you may find it useful to download the guide from the Dutch I-mode site; helpfully it's in English and, as well as a guide to the Emojis, it includes a table comparing attributes between cHTML, HTML and XHTML MP. Download the pdf from www.imode. nl/pdf/download/How_to_create_an _i-mode_site_1_3.pdf.

Input and telephony

When it comes to obtaining information from users who are on a mobile browser, a big problem is the lack of a full keyboard. An additional attribute for input fields, istyle, is used to let you choose whether input should be numeric or alphanumeric; for example; set it to 3 for alphanumeric or 4 for numbers only. Unfortunately, this is where you'll start to find things get

tricky, if you want to make things as compatible as possible.

For example, while an I-mode phone can be forced into numeric entry mode with a form field like this:
`<input type="text"` ↵
`name="pincode" istyle="4">`
for a phone using XHTML, you need to use format="NNNN" instead of the istyle attribute – though you should be able to use both at the same time without any problems.

One of the useful things about a website designed for mobiles, of course, is that you can use it to initiate calls or add information to someone's address book. Here cHTML is much clearer than the wtai tags that you need for Wap. For example, if you want to create a link to call a particular phone number, you could just use this code in your cHTML:
`<a href="tel:+441234567890"` ↵
`accesskey="1">Call me</a>`

By adding extra options, you can specify all the data that's needed for a phone book entry, which people can create using the menu keys on their phone to save the information, rather than call immediately.
`<a href="tel:+441234567890"` ↵
`email="webdev@pcw.co.uk"` ↵
`telbook="Nigel Whitfield (PCW)`↵
`">Click to call, or press Menu` ↵
`to save my details</a>`
is all that you'll need to create a link that can be used to dial a number directly or save it into the mobile's phonebook. One additional attribute, cti, allows you to include pauses in a string of keys to press. My voicemail lets me access a mailbox by pressing the # key followed by 1 and then I

need to enter a three-digit Pin code and press 4 to play back new messages. Putting this code on a web page would let me do it automatically – I just have to press a key once the voicemail answers, to tell the phone to carry on:
`<a href="tel:+441234567890"` ↵
`cti="+441234567890/#1,987,4"`↵
`>Check messages</a>`

The / waits for me to press a key, and a comma (,) is a one-second pause. I could add this to the web page that lets me program my digital video recorder remotely and I'll have a simple web page with everything I need when I'm away from home.

Resources for I-mode

English language resources for I-mode are fairly scarce on the net, but there are a few useful places to visit; Pukupi's Mimic at http://pukip.com/ tools/mimic/ will let you see what a page will look like, complete with Emoji icons (see screen 1).

Nokia provides the Nokia Mobile Internet Toolkit, which includes a code editor that you can use for WML and XHTML MP pages, complete with colour coding to help you spot problems in your code easily, while the Openwave Developer site allows you to download a Windows-based phone emulator to test your pages, at http://developer.openwave.com.

There is, of course, a lot more to mobile web browsing than just I-mode, and we'll return to the topic in a later column.

In the meantime, a good place to start learning about more of the technologies is the O'Reilly Wireless Devcenter (www.oreilly.net/wireless/), where there are a couple of useful introductory articles to WML and XHTML, plus lots of helpful links (see screen 2). **PCW**

The O'Reilly Wireless Devcenter is a good place to start learning about other technologies for the mobile web

SCREEN 2

Alan Stevens has implemented and supported networks for over 25 years, working for IT vendors, system integrators and customers. He now mostly researches and writes about networking matters.

→ **Comments welcome on the Networks column.**
Email networks@pcw.co.uk
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Mixed platform printing

In our second look at printer sharing, learn how to deal with a variety of OSs

There are several options available for those looking to share printers between Windows, Linux and other operating systems, each with its own advantages and limitations.

Hardware solutions

The easiest approach by far is to employ dedicated network print servers rather than try and share printers attached to host desktop PCs or file servers. These things do cost money, but they can make life simpler and save time, especially if you're unfamiliar with the operating systems.

The hardware required will, typically, take the form of an external device to which printers are attached using ordinary USB, serial or parallel cables or it can be an adapter inside the printer itself (see box on the next page). Either way, it's important to understand that such devices do a lot more than simply attach a printer directly to the Ethernet Lan. They also act as a host print server, in many cases emulating not just the type of print servers used by Windows but also those found on Unix/Linux, Apple Mac, Novell Netware and other networks.

Another big advantage is that all the hard work is handled by the print server itself, with no software to load or operating system to configure. In most cases all you have to do to share a printer across different networks is make sure the sharing options are turned on, something usually done via a web-based graphical management tool like that shown in screen 1, taken from a Brother HL-5170DN with an internal print server fitted.

There's nothing particularly special about this printer. It's just a low-cost desktop laser with a built-in print server that enables it to be shared on Windows, Unix/Linux, Novell Network and Mac networks. It also

SCREEN 1

supports the Internet Printing Protocol (IPP) and can even print documents sent via email, with all these and other sharing options configured by clicking the appropriate buttons on the remote management GUI. That done, the various client systems can then locate and connect to the printer using the drivers, utilities and other software they would normally employ.

Unfortunately not all print servers are this comprehensive, making it important to check what's supported before you buy. Plus you may not want to go for such an option or might prefer the DIY approach. In which case there are a number of software alternatives worth exploring, most notably involving either Samba, the Common Unix Printing System (Cups) or the two together.

Samba printer sharing

Samba Is an open-source application, used primarily to enable Linux systems to share files using Microsoft's preferred network protocol – SMB

The print server built into this Brother laser printer can be configured to share the printer on Windows, Unix/Linux, Apple and Novell Netware networks
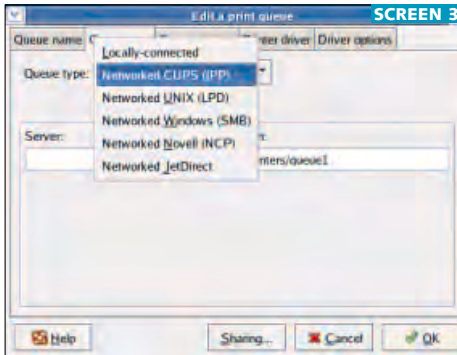
(Server Message Block), also referred to as CIFS (Common Internet File System). Virtually any implementation of Linux can be used to host this software so Samba is included as part of most Linux distributions.

The Samba server doesn't affect Linux users, they just continue to print as normal. However to Windows users, the Linux host with Samba installed appears to be another networked Windows system with any attached printers configured to behave as though shared by a 'real' Windows PC.

Behind the scenes, of course, there's no Windows server as such. Rather the Samba server acts as a print spooler, accepting print jobs from remote Windows PCs then passing them on to the resident Linux printing application. Traditionally, that will be either LPD (Line Printer Daemon) or LPRng (an extended version of the Berkley LPR print spooler), although in recent years these have been replaced by Cups.

You also get the bonus of SMB/CIFS file sharing with Samba, plus support for Windows domain authentication and, in the latest Samba V3 release, Active Directory and LDAP integration enabling, for example, printers to be discovered via the Windows directory service.

Cups has a built-in web-based GUI which can be used to set up and manage printers, print queues and other options

SCREEN 2

SCREEN 3

Some Linux distributions have their own tools to manage Cups, as shown here in Red Hat Enterprise Linux 4 which includes a back-end program to handle a variety of network printer connections

It's possible to upload Windows printer drivers to the Samba spooler and they can be delivered automatically to new clients when they connect to the print server for the first time.

Samba deployment can be involved but setup is fairly straightforward, with a number of graphical tools available to help simplify the setup required

(check out www.samba.org). Note, however, that by itself the Samba server only allows Windows users to send documents to printers attached to Linux PCs. For the reverse to happen the Linux SMB client is required, so for full integration Cups is a better solution.

The Cups approach
Cups differs markedly from Samba, firstly because it uses the IPP, but also because the Cups software will normally be set up to handle the complete printing process. It also has facilities to manage queues and schedule jobs, all configured either via a built-in web GUI (see screen 2) or through a custom interface. As in Red Hat Linux (see screen 3), for example.

Another difference with Cups is that the end user doesn't need a separate vendor-specific driver for each printer they want to send documents to. Instead when documents are 'printed' they're all converted to Postscript before being forwarded onto the print server, with

printer-specific options handled using readily available Postscript Printer Definition (PPD) files for the printer involved.

If the target printer supports Postscript the job can then be forwarded on. If not, Cups will apply filters to convert the Postscript output to another language. Added to which custom back-end programs can be used to direct documents to types of printer with back ends for use with Windows printers, along with others for Novell Netware queues, HP Jetdirect devices, USB and other interfaces.

The advantage of this approach is that end users only need one client printer driver. Moreover, if you combine Cups with Samba it's possible to automate the downloading of the drivers required and enable the print server to be included as part of an Active Directory domain. Changes to the printers are also a lot easier to manage, with Cups now very much the favourite and worth looking into if you want to support mixed platform printing on your network. **PCW**

Direct decisions and connecting considerations

Connect a printer directly to the network and it's much easier to share with no reliance on the availability of a host PC. However, there are one or two things to bear in mind and a number of decisions to be made before going down this route.

The first decision is whether to use one of the many external print servers on the market or choose a printer with the necessary interface built in. Cost can be a deciding factor here and, although you might expect an external adapter that can handle several printers to work out cheaper, the internal equivalent, if it's ordered with the printer, is often more cost effective. With an internal print server there's no need for a separate power supply or any linking cables (other than to the network), making it a very popular option.

However, you may not have the luxury of starting from scratch and some printers can't be upgraded with an internal adapter, in which case an external print server is your only option. Fortunately there are plenty of products to choose from, most with USB interfaces, although legacy parallel and serial products are still widely available. There's also a wide choice of supplier including HP, with its Jetdirect family, together with other more

specialist networking vendors such as Axis and Netgear, plus possibly cheaper, less well-known brands too.

Wireless print servers are becoming increasingly common and, if you're looking to buy a new Internet router, keep your eye out for products with a print server built in, especially on products aimed at the home and small-business market.

Next, if you're running Windows, you need to decide how best to share the printers attached to your print server, which may sound perverse as, after all, that's what a dedicated print server is all about. However, there are two ways you can deploy and share directly attached printers on a Windows Lan.

Wireless print servers, such as this one from Axis, allow printers to be located where needed without running extra network cables

The first is to simply configure client PCs to print to the printers directly, via the dedicated print server to which they're attached. The other is to configure a Windows server to use the dedicated device, then share the resultant 'Windows printer' on the network. Client PCs then print to the server printer which, in turn, will forward (spool) the documents to the dedicated print server and attached printers.

That may sound longwinded, but take this approach and you get the benefit of being able to download suitable drivers to client PCs automatically. An option not always available on the dedicated print server itself. Documents will also be spooled to the server and client systems freed up quickly which is, again, something a lot of dedicated print servers don't support.

On the downside, if the intermediate server hangs or crashes for any reason, no printing will be possible. In this case you might prefer to configure drivers for both approaches giving users the option of direct printing when the host server is unavailable.

Mark Whitehorn is one of those lost souls who actually likes databases. He splits his time between consultancy, writing, working for two universities and tinkering with old cars.

→ **Comments welcome on the Databases column.**
Email database@pcw.co.uk
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Table manners

Understanding normalisation is not only useful, but it's simpler than you may think

Last month we talked about the way relational databases use multiple tables in which to store data. Simply splitting up the data into a set of arbitrary tables isn't enough; we need to ensure the right data ends up in the correct tables. This process is formally called normalisation.

Don't be scared

However, before we get to the normalisation process, there is a simple way to summarise what it aims to do. Normalisation tries to ensure that information about one class of object is always stored in one table. If you want to store information about, say, students, then you need a Student table. If you store information about lecturers, then you need another table called Lecturers, and so on. In addition, we sometimes use tables to store information about the relationships between these objects.

The immediately apparent effect of this is that you don't store the same information multiple times: a student's details are recorded only once in the Student table. This is a very simple rule and, as we go through normalisation, if you pause every now and then to get an overview of what we are trying to do, you'll find this simple principle is behind every decision we make.

Normalisation is typically described in terms of different levels. The first of these is called first normal form (1NF). This is followed by 2NF and 3NF. This may sound easy, but normalisation is a grotesquely misunderstood process on several levels. For a start, it is full of definitions such as: 'A table is in 3NF if, and only if, it is in 2NF and every non-key attribute is non-transitively dependent on the primary key'. There are also lots of different normal forms – First, Second, Third, Boyce-Codd, Fifth, Domain-key, Restriction-union; the list apparently goes on and on.

SCREEN 1

SCREEN 2

At this point, many people give up on the process entirely. They reason that if each level has a formal definition as complex as the one quoted above for 3NF (and, in truth, many of them are much more complex), no sane person will ever get to grips with the entire process, so why bother even starting?

I understand this attitude but I also believe that an understanding of normalisation is vital if you want to design and build effective databases. The good news is that normalisation is nowhere near as hard to understand as the above suggests. For most purposes, you only need to understand the first three forms; so we'll look at those.

Bad, bad database

I could just list the requirements for each level, but that seems unsatisfactory. After all, these levels don't exist for some arbitrary, obscure, computer-science type reason; they exist because, if you use them, you avoid certain classes of problem. So, rather than show you a good database, I'll show you a bad database where these rules aren't followed, so you can see the real-life problems that ensue.

Screen 1 shows a database that has three tables, each of which breaks one

Top: Three tables demonstrating the problems caused by not applying normalisation

Bottom: Repeated data in the Student table is a clue that the design could be improved

of the first three normal forms. If you have bought the DVD edition of *PCW*, you will find the file DBCJan06.MDB on the cover disc.

Each of these tables produces some obvious problems which we can cure by bringing each table to third normal form. Look at the Student table (see screen 2). Each student can belong to one or more departments. This information has been stored in three columns, each of which is recording essentially the same information – that a student belongs to a particular department. This breaks 1NF, which essentially says that you shouldn't have multiple columns that store the same information. (It would also break 1NF if we used one column and listed multiple departments in one field.)

As I said, all these normal forms exist to prevent problems. One problem with this structure is that it is very difficult to, for example, find all the students who are registered with the philosophy department. You'd have to query each of three columns and then amalgamate the results, which is not easy in SQL (possible, but nasty). In addition, if the rules change and students can suddenly belong to four departments, we need to add another column; for five departments we need yet another and so on.

The solution here is to create another table that lists all the departments, then another that stores information about which student belongs to which department. At a stroke we've eradicated the querying problem and the need to add columns if the rules change. The Student table now contains student information and the Department table holds departmental information. The third table contains information about the relationship between the other two objects. In the process, our Student table has attained 1NF.

↘

Careful with that 2NF

The Student/Course table in screen 3 stores details about the relationship between students and courses – in other words, which students are taking which courses. Each 'student taking a course' event is held in a single row with its uniqueness guaranteed by a two-column primary key made up from the StudentID and CourseID columns. The student is identified by a StudentID number and the course is identified by the CourseID number. Together these IDs tell us that, for instance, Lloyd Pugh is studying Greek philosophy. The two-part key will always be unique because a student cannot take a course more than once (if we assume all the data here pertains to a single academic year).

2NF says that columns of data must always be dependent upon the full primary key so, if the primary key comprises two parts, the data in the rest of the table must be dependent on both parts of the key. Look at the Grade column: for the mark to have any meaning, you have to be able to identify both the student and the course to which it refers. The grade, therefore, depends on both parts of the primary key, so the Grade column isn't a problem here. Check out the StudentDOB column: unsurprisingly it contains the students' birth dates. These dates make sense when they're assigned to an individual student, but they have no bearing whatsoever on the course that student is following. The StudentDOB information is dependent on only half of the two-column primary key, and therefore subverts 2NF.

However, it breaks 2NF, which means that every time a student signs up for another course we have to enter their DOB again. Not only is this tedious, but it also increases the chance that we will make a mistake. The cure is to move the birth date information into a new column in the Student table. This is logical because the data does, after all, belong to an object of the class 'student'.

You may be thinking that you'd never put student birth dates into a table about which student takes which course. That's great – you're already thinking along the perfect lines for designing a database in 3NF. In my examples, it's fairly obvious something is wrong, but if you can understand the principle as illustrated here, you'll be able to apply it when normal form rules are broken in more subtle examples.

Understanding normalisation lets you identify tables with a problem and, although the text books may confound with unwieldy descriptions, that doesn't stop the cures being easy. Curing the problems in our Student and Student/Course tables has simply involved creating a new table and moving some data around – hardly rocket science.

Next month I'll look at the third table and explain how it breaks 3NF: I'll also show you the complete database in 3NF. In the meantime, you could inspect the Courses table and consider how its design is flawed. **PCW**

Clubbing revisited

One topic has been running for several months in this column (*PCW* September and November 2005), started with a request from Nigel Williams. He has a club membership database which contains an ADDRESS table and another called PEOPLE. Nigel wanted a report that showed each address once, then listed the people who live at that address. I supplied a solution that produced the right answer, but my report listed the people vertically rather than horizontally as Nigel had requested. I said that, as far as I was aware, Access' report writer couldn't do this by GUI alone, but asked anyone who knew differently to drop me an email.

Ken Sheridan sent in a solution for this. The trick is to have a multi-column sub-report for the people with the columns flowing 'across then down'. When the last column is reached the data flows to a new line. If you've bought the DVD edition of *PCW*, there's a report on the cover disc called rptAddresses_Sub in the database KensClubMembership Jan06.mdb.

Ken also supplied a solution that uses a single report based on a query joining the two tables by using code, rptAddresses_Code.

Ken has contributed to this column since 1998 and his suggestions are invaluable. The code he has supplied is extensively commented (see screen 4) so you can follow it and learn how it works.

Mayo Marriot came up with a different solution to the problem that addresses it from the query
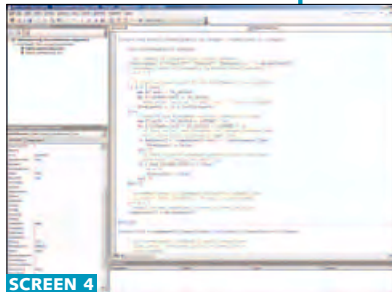
SCREEN 4

Sheridan's code is beautifully commented

end. He suggests a query of the general form:

```
TRANSFORM First(AddressAnd↵
People.FirstName) AS First↵
OfFirstName
SELECT AddressAndPeople.↵
Address1, AddressAndPeople↵
.Address2
FROM AddressAndPeople
GROUP BY AddressAndPeople.↵
Address1, AddressAndPeople↵
.Address2, Int(([fp]-1)/3)
PIVOT ([fp]-1) Mod 3;
```

(Key: ↵ code string continues)

If you've bought the DVD edition of *PCW*, you'll find a query, Mayo, in DBCJan06.mdb on the disc.

As Mayo says, this relies on the FP column being assigned from 1 upwards, or you will get a 'hole', but that may be what is needed, depending on the business requirements. The SQL also shows that on a cross tab you can have 'Group BY' without 'Row Heading'. Try altering the 3 with other values (such as 4) and see the effects.

The Student/Course table below breaks 2NF which is all about dependency on the primary key. The Courses table lets you see how the two-part primary key works

SCREEN 3

Tim Anderson is an IT journalist and software developer, and began writing for PCW in 1993. Since his first Commodore Pet, he has acquired expertise in Rad programming, Windows and the Internet.

→ **Comments welcome on the Visual programming column.**
Email visual@pcw.co.uk
Please do not send unsolicited file attachments.

All change for graphical code

The radical implications of XAML explained; plus how to export an Outlook calendar

Windows Vista, Microsoft's forthcoming operating system, currently set for launch in late 2006, will bring the most radical change to the Windows graphical user interface since Windows 95. I am not talking about the look and feel of the desktop, but rather the code you write to create windows, buttons, listboxes and all the other familiar controls. Old-style code will still work fine, but Windows Vista has an alternative approach called XAML (Extensible Application Markup Language). This is part of the Windows Presentation Foundation (WPF), formerly known as Avalon. Although it is primarily part of Windows Vista, XAML will also be available as an add-on for XP.

There are several ways to look at XAML. From one perspective, it is a kind of HTML for the desktop, letting you define the contents of a window using XML tags. An important difference is that an XAML document is usually compiled and executed, rather than simply being displayed, so a second and more accurate perspective is to see XAML as a declarative programming language. It also has similarities with ASP.Net, in that the design is separate from programming logic, and there is a code-behind file that contains Visual Basic or C# code that drives the interface.

Opinions vary on whether Windows Vista will usher in a new generation of Windows desktop dominance, or whether Microsoft is solving the wrong problems and we will all move to cross-platform web applications instead. Either suggestion is plausible but, whichever way the industry moves, the approach taken by XAML and its rivals is important. Along with its other advantages, this is the best solution yet to an intractable

SCREEN 1

problem, which is how to design a user interface that works well across different screen sizes and resolutions. In the past, Windows has never done this properly. Anyone who has needed to enable 'Large Fonts' will know that some applications misbehave and show truncated or scrolling dialogues along with other anomalies. Coding around this behaviour usually involves considerable extra work, and the problem is getting more severe as

XAMLPad is a sample application that lets you type XAML code and see the results instantly displayed in a preview pane

displays achieve higher resolutions. Some tools mitigate this by implementing docking and anchoring, including Borland's Delphi and the Windows Forms API in Visual Studio.Net, but this still falls short of full layout control.

Java's Swing API is a step ahead of Windows here, in that it uses layout managers to handle scaling and positioning. A layout manager tells a container, such as a panel, how it should arrange its children. For example, a toolbar panel would typically be set North in a Borderlayout container, while the toolbar itself might use Flowlayout to arrange its icons from left to right. The layout system is designed from the beginning with resizing in mind. Swing layout managers work well, although it is initially confusing if you are used to absolute positioning. Getting the right combination of layout managers is a challenge for more complex designs.

XAML has Swing-style layout managers but expressed as XML rather

Understanding declarative programming

Declarative programming specifies how things are, rather than describing the series of steps it takes to get there. It is usually contrasted with imperative programming, which executes a series of statements as in Visual Basic, C#, Java, C++ and many other languages. Declarative programming is a higher level of abstraction, which means that more of the mechanics of computing are hidden from view. XAML makes it easy to contrast declarative and imperative styles, since anything you do in XAML can also be done in C# or other .Net languages. If you wanted to create a Stackpanel containing a Button, you could do in VB, like this:

```
Dim p As StackPanel = New StackPanel
Dim b as Button = New Button
```

```
b.Content = "Click me"
p.Children.Add(b)
```
Or in XAML, like this:
```
<StackPanel>
<Button>Click me</Button>
</StackPanel>
```

Declarative programming has a number of advantages. It is well suited to designing a user interface, since the code is more intuitive and generally more concise. Implementation code is hidden, and the programmer deals in easily understandable high-level objects. On the other hand, some tasks are easier to express in imperative languages. XAML coding combines both, with VB or C# in a separate code-behind file.

than in program code. This makes it relatively easy for visual designers to parse and generate, and even the raw code looks familiar to anyone who has worked with XML and HTML (see screen 1). It is also language-independent, and it turns out that Microsoft intends to use this beyond simply supporting .Net languages such as VB and C#. In September the company announced WPF Everywhere, which still uses XAML but with Javascript rather than .Net for program code. This is Microsoft's cross-platform answer to Flash movies and Java applets. A browser plug-in for Apple's Safari or Mozilla's Firefox will execute XAML applications. In practice it seems unlikely that Microsoft will unseat either Flash or Java in the cross-platform world, but even so it makes a point about the potential of an XML GUI.

XAML controls are not just the old Windows controls wrapped in yet another framework. They are all new and easier to customise. In the old Windows API, controls either have a default appearance, or you can opt for owner-drawing, in which case you have to write considerable code to paint the control as you want it. In XAML you are more likely to be able to achieve what you want through properties, styles and templates. Styles let you define and apply property sets to controls (see screen 2).

Multimedia is another key part of XAML. Unlike the old Windows GDI (graphics device interface), XAML uses

SCREEN 2

SCREEN 3
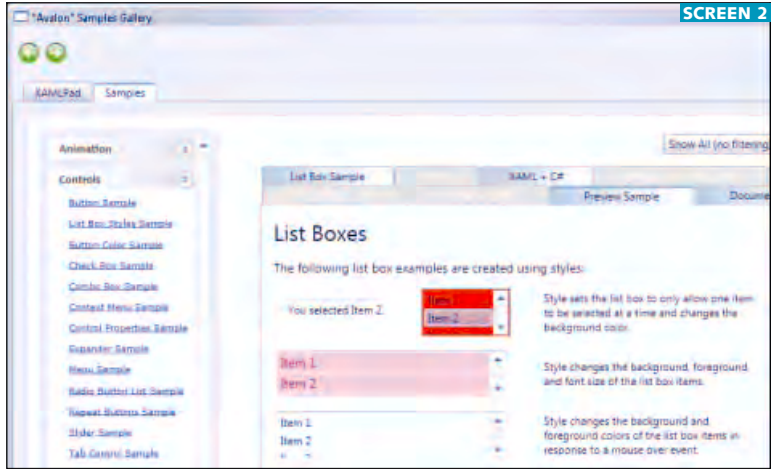
Top: These XAML list boxes show how familiar controls are likely to take on a new and varied look in an XAML application
Bottom: The Gradientbrush's Spreadmethod property is one of many graphical effects available in XAML

DirectX, a set of libraries originally aimed at games programmers. This means that the fast graphics processing offered by your video card will come into play for general Windows applications as well as games (see screen 3). XAML also includes animation, and has a Shapes API, which is pretty much an implementation of SVG, the official web standard for vector graphics. XAML may influence Windows applications in the same way that Flash has influenced websites, introducing more variety and more special effects. It will be harder than ever for developers to get by without design skills.

Windows Vista is at least a year away, and whether XAML will

XAML's cross-platform competition

Microsoft did not invent the idea of defining a GUI with XML. Two other examples are particularly important.

XUL (XML User Interface Language) is a Mozilla project (see screen), and is used in the Firefox web browser and the Thunderbird email client. Unlike XAML, XUL supports styling with CSS (cascading stylesheets). You code the behaviour of XUL widgets in a separate file written in XBL (Extensible Bindings Language). The program code is Javascript.

Macromedia's Flex is an application platform that uses MXML, another XML dialect, to define the user interface. Program code is Actionscript, which is another variant of Javascript. MXML is compiled to an swf, which is the same format as a Flash movie and runs in the Flash player. Flex is also a server-side technology that runs on a Java application server, so that Flex clients can call Java code running on the server.

There are also a number of XML layout Java implementations of XML layout languages including Luxor and SwiXML.

Years before the release of XAML, Mozilla's XUL project used the XML User Interface Language used in Firefox and elsewhere

achieve widespread adoption is unknown. However it goes, defining a user interface in XML is here to stay. Microsoft's work on XAML has increased interest in other approaches such as Mozilla's XUL. Broadband and Wifi everywhere also implies renewed interest in rich web applications, which run on the client but call on web-based data and services. XAML and XUL are well-suited for this, so now is a great time to start exploring.

Does XAML have a downside? Possibly. There's no easy migration for existing applications, and performance is not great on Windows Vista Beta 1, which we used for testing. This should improve as release comes closer. **PCW**

Resources

Download XAML from www.microsoft.com/downloads and search for WinFX SDK. You have to download the runtime components as well as the SDK. These are in beta, so do not use on a machine you care about.

Info on XUL is at www.mozilla.org/projects/xul.

How to export an Outlook calendar

Reader Dave Tennant writes: 'Is it possible to use VBA to programmatically export an Outlook calendar folder as a .pst file?'

Exporting to a file is a handy way to copy or back up Outlook information to another computer. You can do this programmatically, although, like all things Outlook, it is not as easy as it should be (see screen). In a nutshell, you use NameSpace.AddStore to attach a pst file to Outlook. This makes sense, given that the .pst extension stands for 'Personal Store'. If the file does not exist, AddStore will create it. Then you get a reference to your calendar folder and use the CopyTo method to copy it to the new pst file. Finally, call RemoveStore to detach the new file from Outlook.

Getting a reference to the correct folder is awkward. In the Outlook object model, each store is also a top-level folder. You can iterate through its Folders collection and drill down to subfolders through the Folders collection of each individual Folder object. Identifying the target folder is easy enough if it has a unique name or if you know the name of its parent, but if you happened to have an Outlook setup with several stores, all of which are called 'Personal Folders', which is the default name, then you might get the wrong one. The code shown in figure 1 assumes that the folder you have added will be the last one in the Folders collection. Getting the
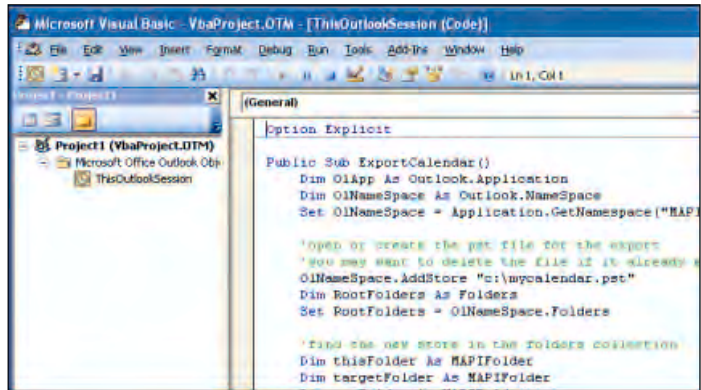
The Visual Basic editor is a powerful tool for manipulating Outlook data, but the object model is not intuitive to use

source folder is easier, since Outlook provides a specific GetDefaultFolder method, unless you wanted to copy a calendar other than the default.

When the code completes, it detaches the store, so it will not show up in Outlook. Unfortunately Outlook seems to keep a lock on the file even after it is detached, so you may have to exit Outlook completely before you can move or delete the exported file.

FIG 1

```
Public Sub ExportCalendar()
    Dim OlApp As Outlook.Application
    Dim OlNameSpace As Outlook.NameSpace
    Set OlNameSpace = ↙
Application.GetNamespace("MAPI")
    'open or create the pst file for the export
    'you may want to delete the file if it ↙
already exists
    OlNameSpace.AddStore "c:\mycalendar.pst"
    Dim RootFolders As Folders
    Set RootFolders = OlNameSpace.Folders
    'find the new store in the folders collection
    Dim thisFolder As MAPIFolder
    Dim targetFolder As MAPIFolder
    Dim srcFolder As MAPIFolder
    'get the default calendar folder
    Set srcFolder = ↙
OlNameSpace.GetDefaultFolder(olFolderCalendar)
    For Each thisFolder In RootFolders

        'get the last "Personal Folders" in the ↙
collection
        'this will be the store you have added
        If thisFolder.Name = "Personal Folders" Then
        Set targetFolder = thisFolder
        End If
    Next
    If (srcFolder Is Nothing) Or (targetFolder Is ↙
Nothing) Then
        MsgBox "Failed to get a reference to the ↙
required folders"
        Exit Sub
    End If
    'do the copy
    srcFolder.CopyTo targetFolder
    'now detach the store
    OlNameSpace.RemoveStore targetFolder
End Sub
```

(Key: ↙ code string continues)

How to buy the best products tested by our Labs

This Buyer's Guide is a comprehensive listing of the best products PCW has tested across a range of areas, helping you to make the best decision when you're planning a purchase. Over the following pages you'll find products, their verdicts and ratings, plus information on where you can read the full review.

CONTENTS

Prices are for guide purposes only and may be subject to change

HOW TO BUY: PCs

Many of the choices you are faced with when buying a PC are covered in the following pages. You need to think about the graphics card, memory, onboard sound or separate soundcard, size and type of hard disk, CD burner or DVD burner and so on.

Once your budget is set, the starting point is the CPU (central processing unit), because it is the brains of your PC.

Intel and AMD offer a bewildering number of processors. The differences between the CPUs are in technical details that don't necessarily mean much to end users. Pricing is also competitive, with AMD PCs generally cheaper than comparable Intel models.

Budget PCs come with Intel's Celeron or AMD's Sempron CPUs. These are aimed at undemanding users. If your needs are for word processing tasks and surfing the Internet with some low-end gaming or image editing, a PC running either of these processors is fine. You won't need a huge hard disk – 80GB will be plenty – coupled with between 256MB and 512MB of Ram and a low-end graphics card, or even onboard graphics for the truly undemanding. You'll be fine with onboard sound, and can expect to pay up to about £500, depending on your monitor.

In the mainstream desktop market it's Pentium 4 and Pentium D versus AMD's Athlon XP and Athlon 64. The chief

1	**Zoostorm 5-6401**	
	£1,200 ★★★★★ Reviewed January 06 www.pcnextday.co.uk	Family PCs aren't often high performers, but this has an Athlon 64 4000+ CPU and Geforce 7800 GT graphics card.
2	**Chillblast Fusion X2 4400 GTX**	
	£2,289.32 ★★★★★ Reviewed November 05 www.chillblast.com	It's not cheap, but it houses a 7800 GTX graphics card, a dual-core Athlon 64 X2 4400+ processor and a 20in monitor.
3	**Dell Optiplex GX620**	
	£715.58 ★★★★☆ Reviewed November 05 www.dell.co.uk	Aimed at the corporate environment, this PC uses BTX technology to keep noise levels down.

difference is that older Pentium 4 and Athlon XP models are 32bit CPUs, while some newer Pentium 4s, the Pentium D and Athlon 64 are 64bit models. To take full advantage of this, you need a 64bit operating system and applications.

More memory can be supported by 64bit systems – 32bit Windows or Linux systems are limited to 4GB of Ram, whereas a 64bit Windows or Linux system can support 128GB. Data is also moved in larger chunks, allowing a theoretical speed advantage.

AMD and Intel offer high-end processors with the Pentium Extreme Edition and Athlon FX ranges, both aimed at the hardcore gaming market. They also have dual-core CPUs. These processors effectively act as two CPUs in one and offer superior performance.

If you're choosing a PC running the above CPUs, other considerations come

down to your needs. If you store lots of music, video or photos, go for a big hard disk – 200GB or above. Memory will help speed up applications, so aim for 1GB or above and don't drop below 512MB. The latest games demand the latest graphics cards, but for most people, cards that were new six to 12 months ago will be powerful enough. And look at the CPU's cache memory, which helps eliminate data bottlenecks.

Most PCs are Windows XP, and the Home Edition is fine. If it's for a small business or you need features such as remote access, buy XP Professional. Few PCs are sold running Linux, and we'd recommend only the technically confident buy a Linux-only system. Linux can always be installed later. Finally, don't overlook the monitor, especially if you're using the PC for gaming or imaging; buy the best you can afford.

169 PRODUCTS REVIEWED TO MAKE YOUR BUYING DECISION EASIER

BUYER'S GUIDE

GRAPHICS CARDS

SUB £200

1

Aopen Aeolus Geforce 6600GT
£116 ★★★★☆
Reviewed January 05
www.aopen.com

Ageing, but well featured and a good choice for less demanding users.

2

Gigabyte Geforce GV-N68 128DH
£192.64 ★★★★☆
Reviewed January 05
www.giga-byte.com

Offers strong performance and its passive cooling means completely silent operation.

3

Aopen Aeolus PCX6600GT-DV128 Extreme
£128 ★★★★☆
Reviewed December 05
www.scan.co.uk

This card offers impressive gaming performance at a very reasonable price.

£200-£349

1

Gecube Radeon X850XT Uniwise
£269.97 ★★★★★
Reviewed May 05
www.gecube.com

A single-slot design using Gecube's own cooling system, and it offers good performance.

2

Powercolor Radeon X850XT Platinum Edition
£320 ★★★★★
Reviewed July 05
www.powercolor.com

Based on ATI's fastest Radeon processor, this card will run the latest games with ease

3

Gecube X850XT Platinum Edition Uniwise
£307 ★★★★☆
Reviewed January 06
www.gecube.com

High-end performance and quiet cooling for AGP motherboards

4

Gecube Radeon X800XL
£209.97 ★★★★☆
Reviewed June 05
www.gecube.com

This card uses Gecube's own Uniwise cooling with a noise level of just 20db.

£350+

1

Aopen Aeolus Geforce 7800 GTX
£364 ★★★★☆
Reviewed October 05
www.aopen.com

Uses the latest 7800 GTX chipset from Nvidia and is one of the cheapest versions around.

2

HIS Radeon X850XT Platinum Edition IceQII
£370 ★★★★★
Reviewed June 05
www.hisdigital.com

Making use of the IceQII efficient cooling system, this is a quiet and super-fast card.

3

Gigabyte Geforce 7800GTX (NX78X256V-B)
£373.53 ★★★★☆
Reviewed October 05
www.giga-byte.com

Fast, moderately priced and it comes with a decent software bundle.

HOW TO BUY

Most graphics cards are based on either the Nvidia Geforce or ATI Radeon family of chips. Each has their strengths and both offer state-of-the-art image acceleration and comparable features.

Performance improves as you move up a range. Top chips offer more features and draw more pixels or textures in a single pass than cut-down, lower-cost options. All current graphics processors are fine for office work, but hardcore gamers currently favour Nvidia's Geforce 6800 or new 7800 series and ATI's Radeon X850 XT chips.

Ensure the card you buy can display favoured resolutions with at least a 75Hz monitor refresh rate to avoid eye strain from flicker (if using a CRT monitor).

There are usually three clock speeds quoted (in megahertz). Core clock is the internal speed of the graphics processor. Memory speed (or memory clock) is the speed of data transfer between the graphics card's onboard memory and the graphics processor. Ramdac speed is the capability of the digital-to-analogue converter that provides the graphics output from the card.

Graphics cards use their own dedicated video memory to store data, images and textures. The more you have, the better the performance. A card with 64MB is fine for office tasks, but we recommend at least 128MB or 256MB for the latest games and video applications.

Around £40 will buy you a Geforce FX 5200 or Radeon 9200 card with 128MB of Ram, which is good for 2D action/strategy games, image editing and less demanding 3D games.

To play 3D action games smoothly, look at £100-£150 cards. Serious gamers should consider the Geforce FX 6800 GT at £280-plus, Radeon 850 XT at £320-plus, or FX 7800 GTX at £350-plus.

Depending on the motherboard, you'll need an AGP or PCI Express graphics card. PCI Express is the newest interface standard, offering up to double the bandwidth of an AGP 8x slot for even faster and more complex graphics. Both ATI and Nvidia offer PCI Express versions of most of their cards. Nvidia also has its SLI (Scalable Link Interface) technology that lets you use two PCI Express graphics cards in SLI-enabled motherboards for ultimate performance. ATI's rival technology Crossfire is due soon.

Look for support for both analogue (VGA) and digital (DVI) displays, and S-video and composite video outputs for use with TVs. Some 'all-in-one' cards have a built-in TV tuner and video-capture options, so you can save money rather than buying separate cards.

NOTEBOOKS

1

Sony Vaio VGN-TX1HP
£1,499 ★★★★★
Reviewed December 05
www.sony.co.uk

A stylish, well-designed notebook with exceptional battery life and a wealth of features.

2

Acer Travelmate 8104 WLMI
£1,499 ★★★★★
Reviewed June 05
www.acer.co.uk

It's not the smallest notebook, but the Travelmate 8104 WLMI is fast and very well equipped.

3

MV Mobeus 1.4 Celeron
£586 ★★★★★
Reviewed October 05
www.go-mv.com

A highly portable, feature-packed notebook that's also very affordable.

4

Evesham Voyager C720
£1,148 ★★★★☆
Reviewed January 06
www.evesham.com

An ultra-fast gaming notebook featuring mobile 7800GTX graphics.

5

Asus W5A
£1,408 ★★★★☆
Reviewed December 05
www.asus.com.tw

An easy-to-use, stylish and well-equipped notebook with great performance.

HOW TO BUY

Notebooks have caught on like wildfire with consumers thanks to plummeting prices and massive marketing campaigns. However, there are so many options that it's easy to get confused.

Decide what you want your notebook for. If it's for occasional use, running some office applications, accessing the Internet and email, then almost any low-cost notebook will do the job. If it's for gaming or running video-editing software, you will be looking for a notebook with a large 15in/17in screen – possibly widescreen – a high-end Nvidia or ATI graphics chip, 1GB of memory and an 80GB (or bigger) hard disk.

In the low-cost arena, Intel has its Mobile Celeron chip and AMD has Sempron. In the midrange/high-end space, there are Intel's Mobile Pentium 4 or Pentium 4 chips, while AMD offers Mobile Athlon 64 and Athlon 64. Expect to find these in desktop replacement systems and those used by gamers.

For the best in performance with power-saving technology, go for Intel's Pentium M or AMD's Turion 64 processors.

Any notebook you get should have in-built Bluetooth and Wifi connectivity, a 30–40GB hard disk drive, 512MB of Ram, 14–15in screen, USB2 or Firewire ports, DVD/CD-RW combo drive and three to four hours' battery life.

MOTHERBOARDS

SUB £100

1	**ECS PF88** £64.63 ★★★★☆ Reviewed August 05 www.ecs.com.tw	The PF88 is feature-packed and compatible with both Intel and AMD processors.
2	**Aopen i915GMm-HFS** £79 ★★★★☆ Reviewed July 05 www.aopen.com	The HFS makes the ideal platform for building a quiet, power-efficient Intel PC.
3	**Asus A8N-SLI Deluxe** £98 ★★★★☆ Reviewed April 05 www.asus.com	A good, all-round AMD SLI board that is packed with plenty of features.
4	**ECS 915-A** £61.81 ★★★★☆ Reviewed June 05 www.ecs.com.tw	All the features you'd expect from a modern Intel-based motherboard and outstanding value for money.
5	**Asus K8N-E Deluxe** £59 ★★★★☆ Reviewed November 04 www.asus.com	A tidy AMD board with lots of room around the major components and a wide range of features.
6	**Epox 8HDA3+** £79.92 ★★★☆☆ Reviewed July 04 www.epox.com	An AMD board that stands out from the crowd thanks to its dual Lan and external Sata support.
7	**MSI 945P Platinum** £99 ★★★☆☆ Reviewed November 05 www.msi.com.tw	An Intel board that features DTS Connect, so you can output true DTS surround-sound audio.

£100+

1	**Gigabyte GA-8N-SLI Royal** £149 ★★★★☆ Reviewed October 05 www.giga-byte.com	Featuring an Nforce4 chipset, this model from Gigabyte supports all Intel 775 processors.
2	**Abit Fatal1ty AN8** £119.80 ★★★★☆ Reviewed August 05 www.abit.com.tw	This AMD board has enough flexibility and Bios features to keep overclockers happy.
3	**MSI 925X Neo Platinum** £114.99 ★★★★★ Reviewed November 04 www.msi.com.tw	Well laid out, reasonably priced and ideal for use with the latest Intel Pentium 4 CPUs.

HOW TO BUY

The motherboard dictates the type of processor you can use, how well the other components communicate, the features on offer and future upgrade potential.

Cheap boards limit processor support, graphics and expansion options. Around £70–£100 gets you the latest technologies.

Most desktop and tower cases use a standard ATX-size motherboard but, if you're building a small system, look at compact MiniATX or MicroATX designs. If using an existing case, make sure you buy the right form factor.

Your choice is also dictated by the processor. You'll need Socket 775 for current Intel processors, Socket A for AMD Athlon XP or Duron, and Socket 939 for an Athlon 64. The Athlon 64 FX series requires Socket 940. If using an older CPU, check the socket type.

We would recommend an Intel P4 or Athlon 64 for a good all-round system. The Athlon 64 can address one terabyte of Ram (1,000GB) and handle difficult calculations with relative ease.

The new generation of processors also change the way data is transferred. Whereas P4s rely on the motherboard chipset to shuttle data between processor and memory, Athlon 64s avoid this by integrating the memory controller into the CPU die.

Divided into northbridge and southbridge, the chipset handles the communication between all the components and dictates the features on offer. Today's leading chipset manufacturers include Via, Silicon Integrated Systems (Sis), ATI, Nvidia and Intel. Chipsets can include integrated graphics.

Today's motherboards mainly use DDR or DDR2 Ram, available in 200, 266, 333 and 400, 667 and 800MHz modules.

Also consider the number of slots available. Fit dual in-line memory modules (Dimms) in pairs if the chipset supports dual-channel operation.

The latest boards support both older IDE and new, faster Serial ATA (Sata) hard disks. Check the number of connectors available for both.

Some chipsets provide Raid support, so data can be spread across two drives for extra performance or backups. SCSI controllers can be found on more expensive boards, or be added with expansion cards.

Also important is the number of USB2 and Firewire sockets for external add-ons. You may need serial, parallel and PS/2 interfaces if using older legacy peripherals. Look out, too, for onboard Ethernet networking, a built-in 56K modem and onboard sound. The latter is fine for all but audio buffs or avid gamers.

SOUNDCARDS

1	**Creative Audigy 4 Pro** £179.99 ★★★★☆ Reviewed July 05 http://europe.creative.com	This updated version of Audigy 2 has fantastic performance and a good software bundle.
2	**Creative Soundblaster X-Fi Elite Pro** £249 ★★★★☆ Reviewed November 05 http://europe.creative.com	This latest Creative offering has a variety of features, but will take time to be fully supported.
3	**M-Audio Revolution 7.1** £99 ★★★★☆ Reviewed July 05 www.m-audio.com	An excellent mid-priced soundcard offering great audio quality, but gamers might be disappointed.
4	**Hercules Fortissimo IV** £44.99 ★★★★☆ Reviewed July 05 www.guillemot.co.uk	If you're looking to upgrade your system, but have a limited budget, this is an excellent option.
5	**Terratec Aureon 7.1 Universe** £114 ★★★★☆ Reviewed July 05 www.terratec.com	We wouldn't recommend this over the Audigy 4 for gamers, but musicians may be tempted.

HOW TO BUY

Many PCs have built-in surround sound on the motherboard. Some support six-channel (5.1), others eight-channel (7.1) and the sound quality is fine for most people.

If you want a dedicated soundcard for playing and making CDs and mp3s, DVDs and games, most will fit the bill.

Entry-level soundcards support 16bit-quality sound recorded or played back at 44.1KHz, which is CD-quality. The next step is 24bit sound at higher sampling rates of 48KHz or 96KHz, recommended for those creating music or playing DVD movies with THX surround or Dolby Digital EX 6.1 or 7.1 sound formats. More cards now also support 24bit 192KHz

playback, required for the DVD-Audio music format.

The signal-to-noise (SNR) ratio, measured in decibels (dB), is the amount of sound you expect (signal) versus that which you don't (noise). Decibel ratings range from 60dB to over 100dB and the higher the dB rating, the better.

Most cards share many similar options, such as microphone-in, line-in/line-out, line-out, Midi/joystick port, CD-in and headphones connectors. Newer cards also have high-speed Firewire ports. Audio enthusiasts should look for S/PDIF (Sony/Philips Digital Interface) -in and -out, to connect speakers via a single optical or coaxial cable and get higher quality digital sound.

Memory sockets
These house the system's memory modules. Today's dual in-line memory modules (Dimms) are usually of the faster Dual Data Rate (DDR) variety

Processor socket
This is where the CPU sits. These are named depending on the type of processor they can accommodate. Intel categorises the sockets depending on the number of pins used by the CPU eg Socket 775 for a 775-pin Pentium 4 etc

IDE and floppy disk connectors
These are where the optical, hard and floppy disk drive data cables connect. The floppy connector is always the smaller of the two types

Serial ATA connector
Used to connect more modern types of disk drive, Serial ATA ports provide faster disk communication than their IDE counterparts — up to 150Mbytes/sec

Bios
The Bios chip holds the lowest-level software in the PC, acting as an interface between the hardware and the operating system

Battery
Keeps your Cmos powered when the main system power is off. Without this, you'd have to reprogram your Cmos on every restart

Northbridge
Part of the chipset — this is found near the processor and is responsible for integrating the Level 2 cache and main memory control functions. It also manages the host and PCI buses and all AGP activities

Power connector
Electrical power is supplied to the motherboard through this connector. The most common type is the ATX block, but on a Pentium 4 board, there is an extra connector to supply the additional 12v needed by the CPU

I/O ports
These ports are used to connect the motherboard with external devices. They comprise USB, PS/2, Firewire, Serial, network and Parallel

Audio ports
Provide input and output for speakers, microphone and other devices. The circular RCA S/PDIF port allows digital audio input

AGP slot
An Accelerated Graphics Port is the connector for the graphics card. It provides the high bandwidth your graphics card needs in order communicate with your processor and display. PCI Express is a faster alternative to AGP and appears on newer models

Onboard audio
Basic audio functionality is provided by the southbridge, but additional multi-channel audio is provided by an extra chip

PCI slots
Peripheral Component Interconnect (PCI) slots can take a variety of PC add-ons, ranging from TV tuners to Firewire expansion cards
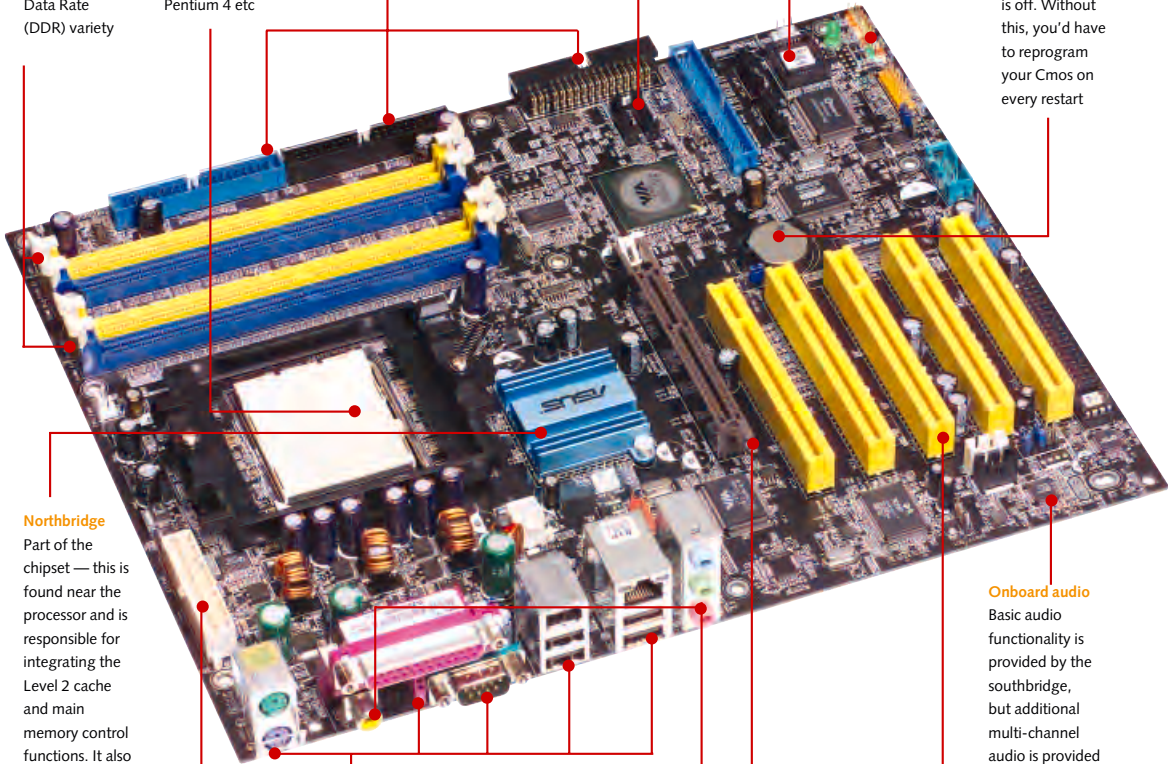
HARD DRIVES

INTERNAL

1

Seagate Barracuda 7200.7 160GB NCQ
£92 ★★★★★
Reviewed December 04
www.seagate.com

Good performance with an 8MB cache and 8.5ms seek time – and you can buy bigger capacities.

2

Seagate Barracuda 7200.8 (ST3400832A) 400GB
£186.96 ★★★★☆
Reviewed July 05
www.seagate.com

This massive 400GB drive offers impressive capacity and an 8ms seek time.

3

Hitachi Deskstar 7K250 (250GB Sata150)
£88 ★★★★★
Reviewed May 04
www.hitachi.co.uk

Those needing a large Sata150 drive will find this a great bargain.

4

Hitachi Deskstar 7K250 (250GB ATA)
£111.86 ★★★★☆
Reviewed May 04
www.hitachi.co.uk

An 8MB cache, 7,200rpm speed and great performance make this 250GB drive a superb buy.

5

Western Digital Caviar WD1600JD (160GB Sata150)
£72.61 ★★★★☆
Reviewed May 04
www.wdc.com

With dual power connectors this drive will suit users transitioning to Sata technology.

EXTERNAL

1

Maxtor Onetouch II Firewire 800 300GB
£179 ★★★★★
Reviewed November 05
www.maxtor.com

A good-quality 300GB USB and Firewire hard drive that comes with backup software.

2

Lacie Safe Mobile Hard Drive 80GB
£149 ★★★☆☆
Reviewed December 05
www.lacie.co.uk

Featuring a fingerprint reader for security, this 80GB external hard drive would suit business users

3

Buffalo Linkstation 120GB
£240 ★★★★☆
Reviewed October 04
www.buffalotech.com

If you want easy-to-use external network storage, this is a great choice.

4

Smartdisk Firelite 80GB
£189.98 ★★★★☆
Reviewed October 04
www.smartdisk.co.uk

Available with either USB or Firewire interfaces, it's a great performer at an attractive price.

5

Siwara SW Pocket 20GB
£246 ★★★★☆
Reviewed October 04
www.hki-systems.co.uk

Excellent software and a miniature form factor make this a great product.

HOW TO BUY

If you're building a high-performance system, buy the fastest drive you can afford; if you just want lots of capacity then slower drives offer better value.

OEM or 'brown box' drives are cheaper – this is the bare drive without the extras, such as cables, included in retail boxed versions.

The transfer rates in today's Ultra ATA drives are 100Mbytes/sec (133Mbytes/sec for Maxtor drives), while Serial ATA (Sata) drives are rated at 150Mbytes/sec. Check the seek times, spindle speed, buffer size and the areal density of the platters (disks).

Usually in milliseconds, seek time is how long a drive's heads take to find data on the disk. The speed at which the spindle holding the disks spins ranges from 4,200rpm for a notebook drive to 15,000rpm for some SCSI drives. Generally, faster speeds give better performance.

The larger the buffer (cache), the more recently written or stored data is held in the drive's memory, resulting in less time seeking the data on the disk.

Areal density is the amount of data stored on a given area of a drive's platter. The more data per square centimetre (gigabytes per platter), the less disk movement is required to bring it under the heads.

Originally Integrated Drive Electronics (IDE), then Enhanced IDE (E-IDE), this common parallel interface is usually written as ATA (AT Attachment), modified with speed improvements in recent years to Ultra ATA/xxx, where xxx is the peak bandwidth in Mbytes/sec. To differentiate Ultra ATA from Sata, the term Parallel ATA is used.

Faster Sata drives are more expensive than Parallel ATA. Sata uses two pairs of high-frequency cables, working at low voltage.

SCSI (Small Computer System Interface) drives are technically no different to ATA drives, but support up to 16 devices on a single channel and you can have multiple channels in a PC. The disadvantage, though, is price.

Most motherboards support Raid (Redundant Array of Independent Disks), which connects multiple drives, to improve performance or provide fault tolerance.

One problem you may hit is the inability to access the new drive's full capacity. Some older Bioses only support drives up to 137GB. This may be solved by updating the PC's Bios. Retail boxed disks often come with software to fool the Bios into recognising the disk, or you can buy a separate disk controller card, which fits into a PCI slot.

DVD DRIVES

1

Toshiba SD-R6472
£83.42 ★★★★☆
Reviewed September 05
www.span.com

A slimline dual-layer DVD writer that performs well and is perfect for small form factor PCs.

2

Philips DVDR16LSK
£59.99 ★★★★☆
Reviewed October 05
www.philips.co.uk

An excellent Lightscribe-capable dual-layer DVD burner that's very keenly priced.

3

LG 12X Super Multi DVD
£116.99 ★★★★☆
Reviewed January 05
www.lge.co.uk

Good-value external USB2/Firewire rewriter with all-format media support.

4

Plextor PX-716A
£105 ★★★☆☆
Reviewed April 05
www.plextor.com

This dual-layer DVD burner combines good performance and a decent software package.

5

Lite-On SHOW-832S
£110 ★★★★☆
Reviewed November 04
www.liteonit.com

A little noisy, but one of the best-value external USB2 dual-layer burners around.

HOW TO BUY

DVD drives have largely replaced CD-Rom, CD-R and CD-RW drives in all but a few entry-level PCs and notebooks. Many systems still offer DVD-Rom drives as secondary drives – used for playback of discs only – while a growing number have a DVD writer or rewriter for burning your own DVDs as the main system drive.

DVD burners can be divided into internal and external drives. Internal drives are cheaper than their external counterparts, but require a level of knowledge so you can install them yourself. You can opt for one of the external offerings which can be hooked up simply via USB2 or Firewire.

Most drives are multi-format, meaning they can write to all key media types, so make sure yours supports DVD+R, DVD+RW, DVD-R and DVD-RW discs. Newer double and dual-layer drives can write to new discs which can store 8.5GB versus the 4.7GB capacity of existing discs. This is useful for backing up your DVD movie collection or chunks of your hard drive on a single disc.

The dual-layer drives cost little more than single-layer drives, so are a good investment. The same cannot be said for the cost of dual-layer discs. A branded, dual-layer 8.5GB disc will cost around £3.75. Rewriteable dual-layer discs will not arrive until the end of 2006.

DIGITAL CAMERAS

1 COMPACT

Canon Powershot A520
£239 ★★★★★
Reviewed July 05
www.canon.co.uk
Perfect for those who want a versatile and easy-to-use digicam without spending a fortune.

2
Nikon Coolpix S1
£229 ★★★★★
Reviewed August 05
www.nikon.co.uk
Small enough to fit in the tightest of pockets – and quality images to boot.

3
Casio Exilim Zoom EX-Z57
£229 ★★★★★
Reviewed August 05
www.casio.co.uk
Another quality compact, with the added bonus of a manual focus and a 2.6in monitor.

4
Konica Minolta Dimage X1
£299 ★★★★☆
Reviewed December 05
www.konicaminolta.co.uk
8megapixels, image stabilisation and a stylish and compact design, but indoor shots can be noisy.

1 PROSUMER
Fujifilm Finepix S5500 Zoom
£179 ★★★★☆
Reviewed February 05
www.fujifilm.co.uk
Good-quality prosumer camera with plenty of features and a good 10x optical zoom.

2
Fujifilm Finepix S7000
£299 ★★★★☆
Reviewed June 04
www.fujifilm.co.uk
Great design and loaded with features, this camera performs well and is a delight to use.

3
Canon Powershot PRO1
£400 ★★★★★
Reviewed July 04
www.canon.co.uk
A well-designed camera for the serious user who wants stunning photos.

4
Nikon Coolpix 8700
£402 ★★★★☆
Reviewed July 04
www.canon.co.uk
Features an impressive 280mm telephoto lens and 30fps (frames per second) movies.

1 DIGITAL SLR
Canon EOS 350D
£799 ★★★★★
Reviewed December 05
www.canon.co.uk
This is a hugely capable digital SLR camera that won't disappoint.

2
Konica Minolta Dynax 5D
£649.99 ★★★★☆
Reviewed December 05
www.konicaminolta.co.uk
A very usable camera, although it's a little weighty. Anti-shake mechanism is excellent.

HOW TO BUY

Decent 4-5megapixels point-and-shoot digital cameras start from about £150, while enthusiasts looking for flexibility can buy a new fully featured digital SLR for under £600.

In general, the higher the megapixel count of a digital camera's sensor – and the bigger the sensor's physical size – the more detailed the images.

Four to 5megapixels is good for 8 x 10in or larger prints. The quoted 'effective' pixels number is the camera's true megapixel resolution.

Forget digital zoom and concentrate on the optical zoom, which zooms in on the subject and produces a better-quality image. Digital zooms simply crop into the centre of the picture.

Also be wary of interpolation – a technique that mathematically inserts new pixels in between existing ones. It can result in blurry pictures.

The minimum optical zoom is typically 3x; about 35-105mm. If buying an SLR, multiply a lens size by 1.6 to get its true focal length, so a 100mm lens is 160mm when put on a digital body.

Look at the selection of automatic or preset picture modes for standard shots, portraits, night shots and landscapes, plus macro modes for close-up photography.

Movie modes aren't as good as even a basic camcorder, but are fine for short movie clips to play on your PC. Check how many frames per second (fps) they offer – most are 15fps, but some are 30fps, which means the video will be smoother.

Experienced photographers will want manual controls for aperture and shutter priority, white balance and focusing. Good cameras should also provide quick and easy access to image quality, resolution and format settings.

Built-in flashes are fine for everyday shots, and many include a red-eye reduction mode, but cameras with a hot-shoe for external flashes will allow much greater illumination and control over lighting.

Check start-up time because cheaper models are likely to take longer to be ready from switch-on. And check shutter lag, as there may be a delay between pressing the button and taking the photo.

Many models use NiMH (nickel-metal hydride) rechargeable batteries, but lithium batteries typically last longer. Also, smaller cameras often mean smaller capacity batteries.

Finally, remember digicams must write the image onto flash media before taking the next shot, and the better quality the card, the faster this will happen.

CAMCORDERS

1
Sony DCR-HC19E
£297.87 ★★★★☆
Reviewed September 05
www.sony.co.uk
An excellent low-cost camcorder with a touchscreen LCD and good video software.

2
Canon MV850i
£349 ★★★★☆
Reviewed September 05
www.canon.co.uk
Simple to use and good quality, although it doesn't come with video-editing software.

3
Panasonic VDR-M55B
£499.99 ★★★★☆
Reviewed December 05
www.panasonic.co.uk
Expensive, but being able to burn footage direct to DVD makes it easy to use

4
Samsung VP-D453
£280.84 ★★★☆☆
Reviewed September 05
www.samsung.co.uk
An attractive, compact camcorder with a good range of features and decent-quality images.

5
Panasonic NV-GS21
£322.54 ★★★☆☆
Reviewed September 05
www.panasonic.co.uk
A robust model with good image quality and a wide range of connectivity options as standard.

HOW TO BUY

Smaller camcorder designs are easy to carry, but can be awkward for larger hands.

The MiniDV format is usually in mid-range to high-end models. Digital-8 is entry-level and plays analogue Hi8 and 8mm tapes.

Some digicams record directly to DVD-R/RW and Ram, or solid-state memory cards. The amount of data needed for quality video makes the latter impractical. Sony's tiny MicroMV is a better alternative. Cassettes are smaller than MiniDV and it stores video in mpeg-2. Files are smaller for editing, but you'll need software that accepts this type of data.

Look at optical zoom and forget digital zoom. Around 10x is

normal, with up to 20x for more expensive models.

To transfer edited images back to tape you'll need a DV-in and out Firewire (Ilink/IEEE 1394) port. Otherwise DV-in is fine to transfer footage to your PC.

Built-in microphones are susceptible to noise, so look for a 3.5mm jack or an accessory shoe and use a separate mic.

Most digicams take still photos, but limited resolutions mean you're better off with a dedicated stills camera. In addition, look for image stabilisers (optical is better than digital) and a good range of AV connectors. Some camcorders have a USB port, so they can be used as a webcam.

PRINTERS

PHOTO PRINTERS

1 Epson Picturemate 100
£100 ★★★★★
Reviewed January 06
www.epson.co.uk
High-quality photo printer that's cheap and easy to use

2 Canon Pixma IP5000
£129 ★★★★★
Reviewed June 05
www.canon.co.uk
If it's pixel-perfect printing you're after, look no further than the IP5000 – a real bargain.

3 HP Photosmart 8450
£170 ★★★★★
Reviewed April 05
www.hp.com/uk
HP's Photosmart 8450 is a bulky printer, but it's capable of producing stunning photo prints.

4 Canon Selphy CP-600
£199 ★★★★★
Reviewed September 05
www.canon.co.uk
The best compact photo printer we've looked at in terms of quality and price.

MULTIFUNCTION DEVICES

1 Brother DCP-310N
£99 ★★★★☆
Reviewed February 05
www.brother.co.uk
Complete range of scanning and printing features, along with an Ethernet port for network usage.

2 Canon Pixma MP150
£69 ★★★★☆
Reviewed December 05
www.canon.co.uk
Photo quality might not be the best, but as a budget MFP the MP150 is a great buy

LASER PRINTERS

1 Dell 1600n
£236 ★★★★☆
Reviewed September 05
www.dell.co.uk
A good multifunction mono laser, perfectly suited to small or home offices.

2 Canon LBP-5200
£224 ★★★★☆
Reviewed October 05
www.canon.co.uk
A great-value colour laser printer that's both small and capable of delivering quality prints.

3 Dell Laser Printer 1100
£93 ★★★★☆
Reviewed November 05
www.dell.co.uk
A cheap mono laser printer, but it comes with a relatively small starter toner cartridge.

4 HP Laserjet 1020
£89 ★★★★☆
Reviewed August 05
www.hp.com/uk
A great home laser printer that's fast, good quality and is one of the cheapest lasers available.

HOW TO BUY

If you don't need colour, consider a monchrome laser or LED printer. The latter tend to be cheaper and may last longer than a laser, but LED printers have a fixed resolution and can't take advantage of software-based resolution enhancements.

If you print hundreds of pages a week, a laser is the best option as they're cheaper and more reliable for high-volume printing. If you print a few pages a month, buy a cheap colour inkjet. If printing high-quality colour photos, buy a good photo printer.

Look for the manufacturer's quoted 'duty cycle' – this is how many pages a month the machine can handle. Choose a duty cycle three or four times larger than your expected average usage. Also check the printer's 'engine life' or 'total print volume' – after this expires, the printer's on borrowed time and uneconomical to repair.

Quoted printer speeds often refer to the speed the printer pushes a blank sheet of paper through the mechanism; for documents they tend to refer to lower quality settings. PCW's tests use real documents and photos, giving a better idea of print speed.

For serious inkjet photo printing, consider higher-end models that use six, seven or eight colour cartridges. Normal inkjets use three colours (cyan, yellow and magenta) plus black, while specialised photo printers add extra shades to improve colour fidelity. Cheaper models often combine three colours in a single cartridge, which is not as economical as using separate cartridges for each colour.

Some 'convertible printers' use four separate black cartridges for longer-life mono printing and you can replace three of them with cyan, magenta and yellow cartridges for colour printing.

Laser models for business use often have a large number of paper-handling options. They're usually modular so you can add features as required. They also have a wider range of interface options and consumables.

You'll often find bundled software with a printer. Their quality varies, but there can be some useful programs.

The quality and usability of the driver software is vital, but it's difficult to assess before buying. Check PCW's reviews and online forums (www.pcw.co.uk/forums) and read the manufacturer's technical support site for any known problems.

Third-party or refurbished consumables generally work fine, but can cause problems with quality and reliability. Your warranty may not cover the use of non-approved consumables.

FLATBED SCANNERS

1 Epson 2480 Photo
£79 ★★★★★
Reviewed February 05
www.epson.co.uk
It's rather large, but is easy to use and includes a transparency adapter.

2 HP Scanjet 3770
£69 ★★★★☆
Reviewed February 05
www.hp.com/uk
You get plenty of scanning options, plus it's fast and produces good image quality.

3 Mustek Bearpaw 4800TA Pro II
£69 ★★★★☆
Reviewed February 05
www.mustek.com
Simple to install and it includes a built-in transparency adapter with automatic cropping.

4 Visoneer Onetouch 9220 USB
£99.99 ★★★★☆
Reviewed February 05
www.visioneer.com
You get plenty of features for your money, and it produces good-quality scans.

5 Canon Lide 35
£59 ★★★☆☆
Reviewed February 05
www.canon.co.uk
Compact, stylish with some useful software, but it doesn't include a transparency adapter.

HOW TO BUY

Flatbed scanners are the simplest way of digitising your old photos. Whether you just want to back them up on your PC, email them, stick them on a website or edit them, just hook up a scanner to your PC or notebook and off you go.

That said, not all scanners are created equal and there is a huge choice out there. Here are some key features to look out for to make it easier.

A good scanner will connect via USB2 or Firewire. Try and avoid older models offering USB1.1 since large scans can take a while to transfer to your PC. It should also offer at least 48bit colour depth and a resolution of 2,400 x 2,400dpi. This is more than enough for scanning photos or documents.

Also look out for a 35mm slide adapter for scanning slides or, even better, an automatic film loader that allows you to insert your film negatives or slides for simple scanning and enlargement.

On the software front, see if your model comes with tools that allow you to fix and edit the photos. This can include anything from removing red-eye, to colour restoration and eliminating dust and cracks. Some entry-level models even come with a cut-down version of the leading professional editing software, Adobe Photoshop.

ROUTERS

1 | **Netgear 108 ADSL router**
£159 ★★★★☆
Reviewed April 05
www.netgear.co.uk
| If you need a Super-G router with built-in ADSL modem, this offering from Netgear is great value.

2 | **Ozenda 11g ADSL Router**
£70 ★★★★★
Reviewed November 04
www.ozenda.com
| Ozenda has come up trumps – wireless ADSL doesn't get any easier than this.

3 | **3Com Office Connect ADSL Wireless 11G**
£59 ★★★☆☆
Reviewed August 05
www.3com.co.uk
| A wireless ADSL router that's good for Soho environments and simple to set up and configure.

WIRELESS

1 | **Linksys WAG54G (wireless)**
£76 ★★★★★
Reviewed August 05
www.linksys.com
| This 802.11g wirleless model offers advanced features for home and professional users.

2 | **Netgear WGT634U**
£106 ★★★★☆
Reviewed August 05
www.netgear.co.uk
| Good design, high quality and easy configuration make this a great wireless choice.

3 | **Draytek Vigor 2600G**
£151 ★★★★☆
Reviewed August 05
www.draytek.co.uk
| With plenty of options, it's designed for users looking for advanced settings.

4 | **Belkin Wireless Pre-N router**
£119.99 ★★★★☆
Reviewed April 05
www.belkin.com
| Excellent coverage and easy installation and configuration make this a great product.

VoIP

1 | **Intertex IX66+ ADSL Airsip GW (wireless VoIP)**
£269.08 ★★★★★
Reviewed March 05
www.intertex.se
| For a small business needing multi-user VoIP telephony, the Intertex IX66+ is hard to beat.

2 | **Zoom Zoomtel X5V**
£100 ★★★★☆
Reviewed March 05
www.zoom.com
| For a no-fuss VoIP solution at home, the Zoomtel X5V is worth considering.

3 | **Draytek Vigor 2500V**
£139.83 ★★★★☆
Reviewed March 05
www.draytek.co.uk
| A great wired router for those wanting to reap the benefits of VoIP telephony.

HOW TO BUY

The router is at the heart of any home network. Costing less than £100, they are an inexpensive way to exploit the advantages of being able to share information between the computing devices in your home.

A router is a simple networking device to which you connect your PCs and notebooks using a network cable. They often include built-in firewalls and other security measures, making them ideal for protecting your PCs from intruders.

The router connects to your broadband modem, as long as your modem uses an RJ45 Ethernet connection – most routers don't support USB modems. Special broadband routers, also called ADSL gateways, come with built-in ADSL modems. If your broadband is provided via a cable company's set-top box, you should buy a standard router without a built-in modem.

Once hooked up, your devices can share the broadband connection as well as swap data and let you play networked games. Wireless (Wifi) routers are increasingly popular in the home market, allowing devices to remotely connect to the Internet and each other without the need for cables – but wireless routers also usually have ordinary network (Ethernet) ports to let you connect non-wireless devices.

Wireless standards

802.11b This was the first and, until recently, the most common wireless variant used. With transmission speeds of just 11Mbits/sec it is also the slowest. It also used the 40bit Wireless Equivalency Privacy (Wep) security protocol, which was found to have a number of holes. An updated version of this, 802.11b+ boosted speeds to 22Mbits/sec.

802.11g This is now the mainstream standard in use, offering more respectable data transfer speeds of up to 54Mbits/sec – although in reality speeds are much lower. It also uses the more robust Wifi Protected Access (WPA) security protocol. Both 'b' and 'g' products can work together, which is handy if you have older 802.11b kit you still wish to use on your home network.

802.11n This is still in the process of being officially ratified and will not arrive in its final form until next year. It promises real data transfer speeds of 100Mbits/sec and, theoretically, up to 300Mbits/sec as well as increased range. At the moment there are two competing groups battling for supremacy. There are already numerous 'Pre-N' or 'Mimo' routers available that offer significant data transfer speeds over 'g' routers.

SPEAKERS

1 | **Creative Gigaworks S750**
£237 ★★★★★
Reviewed April 04
http://europe.creative.com
| Although no Dolby Digital encoder is included, the sound quality and construction are superb.

2 | **Logitech X-530**
£59.99 ★★★★☆
Reviewed July 05
www.logitech.co.uk
| Sleek design, great sound quality and a performance that belies the bargain price.

3 | **Hercules XPS5-101-Black**
£99.99 ★★★★☆
Reviewed July 05
www.guillemot.co.uk
| Excellent build quality, easy to set up, lots of power and a fantastic remote control.

4 | **Creative Inspire T7900**
£99.99 ★★★☆☆
Reviewed July 05
http://europe.creative.com
| A 7.1 surround system with surprisingly good sound quality, but it won't cost you a fortune.

5 | **Logitech Z-5500 Digital**
£279.99 ★★★☆☆
Reviewed July 05
www.logitech.co.uk
| With a built-in Dolby Digital decoder, this set also delivers impressive audio performance.

HOW TO BUY

PC speakers have come a long way, with most manufacturers now offering 2.1, 5.1, 6.1, 7.1, and even 8.1 packages.

Here are three things to watch for when you're looking to buy. First is the output, often expressed in watts. Try to look beyond the manufacturer's statements, as they can be misleading. For instance, a 125w output might comprise a 100w sub-woofer and five 5w speakers. You may see speaker output quoted as PMPO (Peak Music Power), which relates to the maximum output that can be achieved under perfect conditions and is misleading. Lastly, there is RMS (Root Mean Square), which is expressed in watts, for example

total 200w RMS. This is a better reference for overall power, but not perfect.

Impedance is measured in ohms and tells you how much of an electrical load a speaker presents to the amplifier.

The higher the impedance, the less power the amplifier needs to drive it. The average on most speakers is 8ohms. If lower than 8ohms the amplifier has to work harder to drive the speakers, which can result in distortion.

Frequency response refers to a speaker's tonal qualities and its ability to reproduce sounds at different frequencies. Speakers listed as having a response of 20Hz-20KHz are the most common for PC speakers.

↘

MONITORS

17IN

1

Samsung Syncmaster 173P

£237 ★★★★★
Reviewed November 04
www.samsung.co.uk

Ergonomic, with a good picture quality, if slightly under-saturated, and the screen is very adjustable.

2

Viewsonic VP171B

£229 ★★★★☆
Reviewed November 04
www.viewsonic.com

The VP171B has great picture quality, but the viewing angles are slightly restrictive.

3

Shuttle XP17 Temp AR

£453 ★★★☆☆
Reviewed June 05
www.shuttle.com

A clear bright screen that's stylish and portable, but a little on the expensive side.

19IN

1

Acer AL1922HS

£279 ★★★★★
Reviewed September 05
www.acer.co.uk

The AL1922HS offers a great balance of features, performance and price.

2

CTX S966A

£219 ★★★★☆
Reviewed September 05
www.ctxeurope.com

Excellent value for money and looks a lot more expensive than it really is.

3

Samsung Syncmaster 913N

£229 ★★★★☆
Reviewed September 05
www.samsung.co.uk

A great combination of features and quality for this 8ms model, but lacks DVI connectors.

4

Viewsonic VP191b

£349 ★★★★☆
Reviewed July 05
www.viewsonic.co.uk

It has a fast 8ms response time, easy-to-use menus and excellent picture quality.

20IN+

1

LG Flatron L2013P

£549 ★★★★☆
Reviewed October 05
www.lge.co.uk

Well designed, high-performance monitor, with ergonomic features making it good for prolonged use.

2

Viewsonic VP201

£530 ★★★★★
Reviewed August 04
www.viewsonic.co.uk

If you need a high-resolution 20in panel, the the VP201 is a good choice.

3

Fujitsu-Siemens Scenicview P20-2

£492 ★★★☆☆
Reviewed August 05
www.tracline.co.uk

Fairly good all-rounder for the price, good clarity, but didn't accurately render some tones.

HOW TO BUY

CRT (cathode-ray tube) monitors are less fashionable, mainly due to the rapidly dropping prices of TFT (thin-film transistor) flat-panel models. But CRT technology is more than 100 years old and has a lot of strengths. CRTs are bulky, heavy and power-hungry, but are now excellent value for money.

Resolution is the number of graphics elements displayed on a screen. Known as pixels, they are generated by your graphics card. In any TFT or LCD, each pixel is composed of three sub-pixels coloured red, green and blue. In a CRT the pixels are spread in a grid across the screen separated by a distance called the dot pitch. The smaller the dot pitch, the sharper the image.

With TFTs, each pixel is composed of three rectangular thin-film transistors. The number of pixels equals the 'native' resolution; a 1,024 x 768 TFT will have exactly that number of pixels horizontally and vertically.

CRTs usually have a higher resolution than a TFT of the same size and work perfectly at any standard resolution up to the quoted maximum. Running a TFT below its native resolution can result in a poor picture.

Check your TFT's native resolution meets your needs – gamers wanting 1,600 x 1,200 will probably need an expensive 20in model – most 19in panels are currently limited to 1,280 x 1,024 and budget 14/15in models might only support 800 x 600.

Modern TFTs can be viewed from a wide range of angles vertically and horizontally, but anything over +/- 45º makes no difference in normal use.

Response time is the time taken for a pixel to reach maximum brightness – 12-25ms is typical – faster is better. Some newer monitors now have response times of 4ms or 8ms.

TFTs have high quoted contrast ratios, but this is often a maximum figure. Evenness of lighting is more important than the overall brightness specification.

The ISO 13406-2 standard specifies minimum requirements for display contrast, viewing angle, brightness, reflections, flicker, contrast and defective pixels. You may see the standard incorporated in a TUV label with the words 'Ergonomics Approved' or 'ISO 13406-certified'. The TCO'95 and '03 standards cover electromagnetic emissions, noise and ergonomics – ensure the monitor has at least one of these. ISO 13406-2 has stringent standards for defective pixels. Only Class I TFTs are guaranteed no defective pixels – most consumer models are Class II. Some manufacturers offer some dead pixel guarantees with Class II TFTs.

TV TUNERS

1

Nebula Digitv

£99.95 ★★★★★
Reviewed August 05
www.nebula-electronics.com

This external USB2 tuner has a built-in web server to let you share TV over your network.

2

Twinhan Magic Box

£69.99 ★★★★☆
Reviewed August 05
www.twinhan.com

A stylish external USB2 tuner with good software and an attractive price.

3

Terratec Cinergy 400 TV

£89.99 ★★★★☆
Reviewed March 05
http://en.terratec.net

A PC Card-based analogue tuner with good software, it's a great buy for laptop users.

4

Visionplus VisionDTV

£69.99 ★★★★☆
Reviewed November 04
www.twinhan.com

A bargain price and top-notch features make this a must-buy USB2 digital TV tuner.

5

Avermedia Avertv DVB-T USB2

£84.99 ★★★★☆
Reviewed August 05
www.averm.co.uk

The Avertv impressed us with its sheer simplicity, and its small size makes it ideal for notebook users.

HOW TO BUY

Internal TV tuners require a PCI slot. External options connect via USB and are easier to set up. Hi-speed USB2 is often needed and devices typically require Windows ME, 2000 or XP. Check if you run Windows 98 or NT.

A Freeview digital tuner offers the best channel choice, picture and sound, but may need an outdoor aerial or a wideband aerial (you can check at www.freeview.co.uk). Analogue terrestrial TV tuners may give better results if using an indoor receiver. If a digital tuner receives radio it doesn't always mean digital audio broadcasting (DAB) support. Look for Teletext and subtitle support.

Digital tuners record to disk for maximum quality; analogue signals need to be digitally encoded – look for mpeg-2 hardware for realtime video and audio encoding; cheaper tuners need your CPU to do this in software.

Most analogue systems let you capture video from a VCR or camcorder. Look for composite or S-video connectors and stereo phono inputs. Typically, an hour of mpeg-2 video uses up to 2GB of disk space. VHS-quality mpeg-1 gives just over an hour on a CD.

Better TV cards have personal video recorder functionality, letting you pause, fast forward and rewind live TV, and have an electronic programme guide to record shows to your PC.

DIGITAL MUSIC PLAYERS

1	Apple Ipod	
	£219 ★★★★★ Reviewed January 06 www.apple.com/uk	All the usual Ipod features but now with the ability to play video
2	Creative Zen Nano Plus	
	£99 ★★★★★ Reviewed December 05 http://europe.creative.com	1GB flash player that houses a radio, voice recorder and mp3 encoding from a line-in source.
3	Apple Ipod Nano	
	£179 ★★★★☆ Reviewed December 05 www.apple.com/uk	Small and thin, this 4GB flash player isn't as fully-featured as some but it looks great.
4	Apple Ipod Shuffle	
	£89 (1GB); £69 (512MB) ★★★★☆ Reviewed May 05 www.apple.com/uk/ipod	Small yet perfectly formed, it's easy to use, has good sound and is set to be a big hit.
5	Iriver H340 SE	
	£339 ★★★★☆ Reviewed January 05 www.epinx.com	A good all-round player with a colour screen and built-in FM tuner.

HOW TO BUY

The mp3 music format recently celebrated its tenth birthday and in that short space of time it has revolutionised the music industry. On the way, it has spawned a global market for digital music players, none more famous than Apple's Ipod and related offerings.

There are two main categories that players can be divided into: Flash memory-based players, which range in size from 256MB to 1GB and mini hard drive-based models, which run from 4GB to 60GB. Prices for a 256MB player start as low as £20 rising to around £300 for a 60GB player. In terms of songs, the difference is the ability to hold 40 on one and 15,000 on the other. If you just want something for using on-the-move, then Flash-based players are the way to go, since they are very small and light.

The software used in many players determines how easy it is to use in terms of tracklisting and organising songs.

If you need a portable record store, then start by looking at the wide range of 4GB-6GB players and, if that's not enough, head for the 20GB, 40GB and 60GB models. Ensure whatever you buy supports playback in different formats. The ability to listen to FM radio and record voice is also a bonus. Most importantly, check out the battery life, since this can vary wildly between similar devices.

SMARTPHONES

1	T-Mobile MDA Pro	
	£139 ★★★★☆ Reviewed January 06 www.t-mobile.com	Well-designed smartphone that's absolutely loaded with features
2	Sony Ericsson P910i	
	£contract dependent ★★★★★ Reviewed December 04 www.sonyericsson.co.uk	The Symbian-powered P9101 has heaps of features and impressed us a great deal.
3	Sony Ericsson D750i	
	£contract dependent ★★★★☆ Reviewed December 05 www.t-mobile.com	It's no substitute for a digicam, but this 2megapixel camera phone is packed with features
4	Sony Ericsson V800	
	£contract dependent ★★★★☆ Reviewed March 05 www.sonyericsson.co.uk	Light, easy to use and with a great screen, the V800 is a great way to explore the benefits of 3G.
5	Orange SPV C550	
	£contract dependent ★★★★☆ Reviewed November 05 www.orange.co.uk	A good smartphone, in terms of functionality, but being Windows-based it's annoyingly slow.

HOW TO BUY

Smartphones are essentially mobile phones that can do a lot more than send texts and make calls. They are increasingly popular because you get both phone and PDA functions in a single device.

There are two key types of smartphones – those that look roughly like slightly bigger mobile phones and those that are essentially PDAs with voice functionality (Blackberry, Palm, Nokia, etc). We will look primarily at the mobile phone smartphones. They usually boast small colour screens and allow you to send email, access the Internet, run third-party applications, use instant messaging software and sort out your calendar and contacts. Even better, all of this information can be synchronised with your PC or laptop and some even allow you to store and play mp3s, take photos and shoot video.

There are two main operating systems in use: Symbian and Microsoft's Windows Mobile 2003, the latter with a new version due. Symbian controls the lion's share of the market at the moment and its key partner, Nokia, ships over 50 per cent of all smartphones. These smartphones are general-purpose devices and suitable for all the above tasks in moderation.

If you are a heavy email user or plan to work on documents on the move, then consider a PDA-style smartphone with a keypad.

PDAS

1	Dell Axim X50v	
	£304 ★★★★☆ Reviewed May 05 www.dell.co.uk	A good PDA, with a great VGA-resolution screen, which is perfect for multimedia use.
2	Asus My Pal A730W	
	£356 ★★★★☆ Reviewed July 05 www.uk.asus.com	A fully-loaded Pocket PC, with a large set of utilities at a reasonable price.
3	Palm Tungsten T5	
	£279 ★★★★☆ Reviewed March 05 www.palm.com	Another sterling Tungsten upgrade with great new features, let down only by having no Wifi.
4	HP IpaqRX3715 MMC	
	£224 ★★★★★ Reviewed November 04 www.hp.com/uk	A fantastic Pocket PC with some great features, but the camera's viewfinder could be better.
5	Palmone Zire 72	
	£169 ★★★★☆ Reviewed August 04 www.palm.com	Provided you don't mind the styling, the Zire 72 is a cheap, yet powerful PDA.

HOW TO BUY

A PDA, or personal digital assistant, is essentially a handheld computer. The PDA market is not as clear cut as it once was, as newer devices with voice capabilities have now arrived. For our purposes, handhelds do not include smartphones.

There are two main types of devices: those that run the Palm operating system and those that run Pocket PC from Microsoft. Both have their advantages, but if you want familiarity, go with a Pocket PC-based device, since it will run versions of common Microsoft applications.

If you plan to write a lot, consider a model with a keyboard. Otherwise, go for a pen-based device which is typically half the price and offers an on-screen keyboard or has handwriting recognition features.

Most PDAs use memory for storage, so look for a device with 64MB or more, if possible. Storage can be boosted using flash memory cards in the SD card slot. Newer devices now have tiny hard disk drives with capacities of up to 4GB.

Most PDAs come with colour screens for viewing photos and media files. If watching video is a priority, go for one with the highest screen resolution. For the best in connectivity, opt for a model with in-built Bluetooth and wireless networking or Wifi technology.

↘

PORTABLE MEDIA PLAYERS

1	**Archos AV400 20GB**	
	£314.99 ★★★★★ Reviewed June 05 www.datamind.co.uk	A great alternative to Microsoft-based models, offering more features than the competition.
2	**Archos Gmini 400 20GB**	
	£239.99 ★★★★★ Reviewed June 05 www.datamind.co.uk	A scaled-down version of the AV400, it's portable, with great battery life and an array of features.
3	**Digital Cube I-Station 20GB**	
	£329.99 ★★★★☆ Reviewed July 05 www.datamind.co.uk	A 20GB model with an FM tuner and mp3 recorder, it also supports a wide range of video formats.
4	**Hauppauge PVMP 20GB**	
	£399 ★★★★☆ Reviewed June 05 www.hauppauge.co.uk	The PVMP offers a large 7in widescreen display, perfect for watching movies.
5	**MSI Megaview 566 20GB**	
	£250 ★★★★☆ Reviewed June 05 http://msicomputer.co.uk	A lightweight media player that will happily record from a video source.

HOW TO BUY

Portable media players (PMPs), also called personal video players (PVPs), are the big brothers of mp3 players with video capabilities thrown in. You may also come across the term Personal Media Center (PMC), which are players built around Microsoft's Windows Mobile operating system.

PMPs, like many larger mp3 players, are based on mini hard disk drive technology and usually start at around 20GB. They allow you to watch movies, view photos and play music files. A good model will support mpeg-2 and 4, wmv and DivX movie formats, as well as mp3, wav asf and wma audio files. Some can also receive and record FM radio and voice.

They come in a variety of sizes, with screens ranging from just over 2in to around 4in. The most common screen size is around 2.5–3in. Thanks largely to the screen and the mini hard drives, PMPs weigh a bit more than, say, an Ipod, but at 150–300g they're not going to be too heavy to carry around. Many of the features on these devices are similar, from screen size to hard disks and supported formats. What sets them apart is weight, screen resolution, movie playback quality and battery life.

Test them out, if possible, or check out the PCW reviews before splashing out.

PERSONAL VIDEO RECORDERS

1	**Plextor ConverTX PVR**	
	£151.56 ★★★★☆ Reviewed June 05 www.plextor.be	The ConverTX is an external analogue tuner that can also record from most video sources.
2	**Twinhan Magic Box**	
	£69.99 ★★★★☆ Reviewed August 05 www.twinhan.com	Another PC-based stylish external USB2 tuner with good software and an attractive price.
3	**Kiss DP-558**	
	£293.75 ★★★☆☆ Reviewed October 05 www.kiss-technology.com	A networkable PVR that lets you play Internet radio, although it has only got an analogue tuner.
4	**Mustek DVD R580**	
	£244.87 ★★★☆☆ Reviewed September 05 www.mustek.com	Lots of features and connectivity options in this combo DVD recorder/hard disk standalone PVR.
5	**Pinnacle Mediacenter 300i**	
	£79.99 ★★★☆☆ Reviewed March 05 www.pinnaclesys.com	The 300i is good value for money if you want to turn your PC into a PVR.

HOW TO BUY

The personal video recorder (PVR), also known as a digital video recorder (DVR), is a device that records TV onto a hard drive in digital format. Unlike video and DVD recorders, there is no need for tapes or disks.

Tivo launched the world's first PVR in 1999 and most PVRs use the mpeg format for encoding video. Unlike VHS recorders, PVRs give you the ability to pause live TV, instantly replay scenes just watched while continuing to record and, most importantly, skip through adverts.

In the UK, Sky+ PVRs dominate the market, with other players, including Tivo and Telewest, trailing a long way behind.

The first thing to consider when buying a PVR is the size of the hard drive. Try going for one with a minimum of 40GB, but 80GB would be better. Most will come with a single Freeview tuner for getting free digital TV signals, but an increasing number are arriving with two. This means you can watch one channel and record another or even record two different channels while watching a previous recording.

At the heart of any PVR is the electronic programme guide (EPG). It's needed for selecting all the things you want your PVR to record. The better the EPG, the more intuitive your PVR becomes, recording programmes by itself based on your previous choices.

BACKUP SOFTWARE

1	**Roxio Backup My PC Deluxe 6**	
	£34.99 ★★★★★ Reviewed June 05 www.roxio.co.uk	Takes the mystery out of backups and is ideal as a simple solution to protect PC files.
2	**Acronis True Image 8**	
	£29.99 ★★★★★ Reviewed February 05 www.phoenixglobalsoftware.co.uk	This easy-to-use disk imaging package should be part of every PC owner's toolkit.
3	**X Drive**	
	$99.50 per year for 5GB ★★★★☆ Reviewed October 05 www.xdrive.com	A flexible, simple-to-use and attractively priced online backup service.

HOW TO BUY

Backing up important data is something a lot of home users, and homeworkers, fail to take seriously. Until, of course, they lose everything and have no way of getting it back. In order to avoid such a calamitous event, consider some form of backup solution now.

Most of the leading backup packages cost between £30 and £50. A good solution will allow you to do full hard disk backups, as well as single files and folders, plus let you schedule backups of data that's changed since the last full backup was executed. They should be easy to install and set up.

Backups should be easy to restore and retain the original file organisation. Any solution should be able to write backups to your hard drive, external hard drives and blank CD/DVD discs.

DIGITAL IMAGE-EDITING SOFTWARE

1	**Adobe Photoshop Elements 4**	
	£69 ★★★★★ Reviewed December 05 www.adobe.co.uk	A great choice for home users looking for an image-editing package that's easy to use.
2	**Adobe Photoshop CS2**	
	£538 ★★★★☆ Reviewed June 05 www.adobe.co.uk	Still the undisputed leader for professional photo editing, but its high price will put most off.
3	**Corel Paintshop Pro X**	
	£99.95 ★★★★☆ Reviewed December 05 www.corel.co.uk	Power, sophistication plus ease of use make this great for beginners and experienced users.

HOW TO BUY

Many digital cameras come bundled with some form of basic photo-editing software, but to move on to the next level you really need to start using a dedicated editing package.

For good mid-range programs, prices range from free for open-source programs such as Gimp, up to about £90.

Look out for features including advanced colour correction, lighting controls, automatic photo-fix wizards, scratch and blemish remover, multiple undo options, special effects, layers and templates. The software should also let you create slideshows, publish to the web, save in many different formats and archive images to CD/DVD discs.

Most importantly, there should be extensive help files, FAQs, tutorials, web forums, email and phone support.

MEDIA CREATION SOFTWARE

1	**Roxio Easy Media Creator 8**	
	£59 ★★★★★ Reviewed January 06 www.roxio.co.uk	Intuitive media editing suite to sort, enhance and share all your digital media.
2	**Pinnacle Studio Media Suite**	
	£89.99 ★★★★☆ Reviewed March 05 www.pinnaclesys.com	A massive amount of software for your money, including an excellent video editor.
3	**Nero 7 Premiere**	
	£49 ★★★★☆ Reviewed January 06 www.nero.com	Not the easiest to use, but plenty of useful features and great DVD authoring capabilities.

HOW TO BUY

This is the software you need for burning CDs and DVDs. Most new PCs and DVD burners come bundled with some kind of media creation software. A good product will allow you to burn audio and video content onto CDs and DVDs, back up data, create electronic photo albums, and make your own DVD menus and labels.

Bundled versions are usually limited, or 'lite', versions of leading brands such as Nero, Roxio Easy Media Creator, Intervideo WinDVD or Pinnacle CD/DVD Creator, among others. You can usually upgrade to the full version online and save about 20 per cent or more on what you would pay for a standalone version.

Prices for standalone media creation software start at £20 for basic CD/DVD authoring software and rise to around £60 for the most advanced suites.

PC MAINTENANCE/UTILITY SOFTWARE

1	**Orlogix Wincleaner Complete PC Care**	
	£34.99 ★★★★☆ Reviewed July 05 www.orlogix.com	If your system is running slower than it should, this package will help restore its performance.
2	**Allume BoostXP**	
	£19.99 ★★★☆☆ Reviewed May 05 www.allume.com	BoostXP makes tweaking your system much easier than doing it manually.
3	**System Mechanic 5 Professional**	
	£49.95 ★★★☆☆ Reviewed April 05 www.itred.com	As well as performing PC maintenance, this product includes firewall and anti-virus software.

HOW TO BUY

Just like your car, PCs need regular maintenance to keep them in good working order. There are tools within Windows that can help, but a dedicated suite of maintenance or utility software should do a better job.

Utility software often comes with a virus scanner, but you may already have one, so concentrate on one with the following features. It should offer a simple overview of system and application performance, the ability to clean out the Registry and restore it easily if any mistakes occur, defragment the hard disk drive and memory, and optimise application performance. It should have some form of reporting and let you simplify the control of key Windows settings.

Other common tools will back up data, recover deleted files and speed up your Internet surfing.

WIRELESS MEDIA STREAMERS

1	**Philips Streamium**	
	£249 ★★★★☆ Reviewed January 05 www.philips.co.uk	It's expensive, but it's easy to set up and can stream video, audio and music with little fuss.
2	**Netgear MP101**	
	£74 ★★★★☆ Reviewed May 05 www.netgear.co.uk	A bit long in the tooth and doesn't stream video, but for sharing audio it's simple and effective.
3	**Pinnacle Showcenter 200**	
	£199 ★★★☆☆ Reviewed September 05 www.pinnaclesys.com	A decent update of Pinnacle's video, audio and photo streamer, despite fiddly interface.

HOW TO BUY

If you want to listen to mp3s stored on your PC through your hifi and look at photos and watch videos on your TV, a wireless media streamer is the way to go. Many devices aren't particularly simple to set up, so you should pick your model carefully.

Speed is of the essence, especially if you're planning to stream video, so 802.11g is a must, but 802.11b devices will be fine for music and photos. If the streamer has an Ethernet port, you can always resort to this if you're having trouble with your wireless connection.

Video output connection options are also important. For highest-quality output, look for component-out sockets. Scart and S-video are good options, while a coax output will ensure even old television sets are able to display streamed video and photos.

KEYBOARDS

1	**Logitech Cordless Desktop S 510 Media Remote**	
	£59 ★★★★★ Reviewed November 05 www.logitech.co.uk	A great cordless keyboard packed with features and a good, low-power consumption mouse.
2	**Microsoft Wireless Optical Desktop Comfort Edition**	
	£79 ★★★★★ Reviewed April 05 www.microsoft.com/uk	Ergonomic, with a good selection of shortcut keys and an innovative sliding zoomer.
3	**Matias Tactile Pro**	
	£81 ★★★★★ Reviewed March 05 www.halfkeyboard.com	Excellent build quality, although a little expensive. It's responsive and has some useful hotkeys.

HOW TO BUY

When picking a keyboard, comfort is paramount. If used daily for long periods of time, ergonomics is also important, especially to help prevent RSI (repetitive strain injury). Check whether it has a wrist rest, decent key spacing and a range of customisable hotkeys.

The breadth of keyboards is huge, with wireless, Bluetooth and biometric all joining traditional models. Wireless keyboards are easy to set up, but there is no single standard. They're good if you need limited mobility around a room, especially if you have an entertainment PC, or for presentations. Bluetooth keyboards offer decent mobility, but can be harder to set up. Biometrics offer a degree of security, but if used on a domain network, may need to be reset every time you change your password.

MULTIFUNCTION DEVICES

1	**Brother DCP-310CN**	
	£69.99 ★★★★☆ Reviewed February 05 www.brother.co.uk	A little noisy and not the best colour output, but has a network function at a reasonable price.
2	**Lexmark P4350**	
	£115 ★★★★☆ Reviewed October 05 www.lexmark.co.uk	Well-designed inkjet MFD, with integrated display, but it's not the fastest printer on the block.
3	**Dell 1600n**	
	£236 ★★★★☆ Reviewed September 05 www.dell.com/uk	A good multifunction mono laser that's suited to small or home offices and is fully networkable.

HOW TO BUY

If you're in the market for a scanner, or want to upgrade your printer, you might want to consider an MFD (multifunction device). Housing a printer and scanner, these devices save space and perform other functions, such as photocopying and faxing. Print quality is usually fairly good, but they can't match up to dedicated photo printers.

Keep an eye out for specs, such as how many ink cartridges it uses, whether you get separate cartridges for each colour, and networking options – even some cheap models house an Ethernet port for network printing. If you want two-sided printing, make sure it has a duplex option.

Finally, check what software comes with the printer and, if packages are included, whether they're only trial versions.

BIOMETRIC DEVICES

1	**APC Password Manager**	
	£34.99 ★★★★☆ Reviewed October 05 www.apcc.com	Great biometric fingerprint reader, but has trouble working with Firefox browsers.
2	**Motion Computing LE1600**	
	£1,773 ★★★★☆ Reviewed October 05 www.motioncomputing.co.uk	A fantastic tablet PC that integrates a fingerprint swipe reader into the chassis.
3	**Sony Microvault**	
	£60 ★★★☆☆ Reviewed October 05 www.sony.co.uk	This USB key houses a standard and encrypted area, allowing for secure portable storage.

HOW TO BUY

With PC biometric security devices now available for as little as £30, it's possible to secure your home PC without spending a fortune. As well as replacing or supplementing traditional methods of security, biometrics can make things easier to use.

Instead of having to remember numerous passwords for your favourite websites, for example, you can identify yourself quickly and easily by placing your finger on a small scanner.

There are a variety of biometric devices available, but many don't work properly with anything other than Internet Explorer, so if you're a Firefox user be sure to check for compatibility. It's also worth checking that the biometric software will work with your PC as some models have trouble when used on a corporate network.

WEBCAMS

1	**Creative Webcam NX Pro**	
	£29 ★★★★☆ Reviewed January 04 http://europe.creative.com	It's been around for some time, but you can't fault the NX Pro for price and functionality.
2	**Panasonic BL-C30**	
	£305 ★★★★☆ Reviewed September 05 www.panasonic.co.uk	Home security network camera with pan and tilt lens. Hooks up to your router, with or without wires.
3	**D-Link DCS 2100G**	
	£239 ★★★☆☆ Reviewed September 05, p61 www.dlink.co.uk	Another network camera, but you can't move the lens and it's a little on the expensive side.

HOW TO BUY

Although a webcam might seem like a simple purchase, there is a huge variety of models on offer.

Even on a broadband Internet connection, live video streaming at anything more than a resolution of 640 x 480 will result in stuttered video. However, webcams with a resolution of 1megapixel or higher can take photos suitable for printing. Don't expect wonders in terms of quality though and, since most require a USB connection, it's no substitute for a digital camera.

More expensive models include their own web server. Known as network or IP cameras, which connect direct to your router and are perfect for home security purposes.

Other features to look out for include an integrated microphone, suitable stand and a decent collection of software.

ONLINE BACKUP SERVICES

1	**X Drive**	
	£57 (approx) per year for 5GB ★★★★☆ Reviewed October 05 www.xdrive.com	Low-price, media-sharing and file storage capabilities make X Drive a great choice for online backups.
2	**Netbax**	
	£11.75 per month for 1GB ★★★★☆ Reviewed October 05 www.netbax.co.uk	A well-designed interface makes Netbax easy to use. You can also limit bandwidth used by backups.
3	**PC Fort**	
	£11.69 per month for 5GB ★★★☆☆ Reviewed October 05 www.pcfort.co.uk	The interface isn't as welcoming as Netbax, but in terms of value for money, PC Fort scores well.

HOW TO BUY

Backing up your data can be a real chore, but fail to do it and you could be in for a nasty surprise. By using one of the many online backup services, things can be made much easier.

When choosing a service, first decide on what you want. Do you need to simply archive your data, or share it with other people? If you're on a standard ADSL broadband connection, a service that lets you limit the amount of bandwidth used during backup is advisable – for SDSL users and those with fast connections this isn't quite so important.

Pricing structures vary wildly and some services charge as much as £25 per month per gigabyte. Make sure you shop around when choosing a service and only pay for those features you require.

ONLINE PHOTO SERVICES

1	**Fotango**	
	From 24p per print ★★★★★ Reviewed September 05 www.fotango.com	With unlimited storage space, this site is excellent for sharing your photos. Print quality is superb.
2	**Jessops**	
	From 15p per print ★★★★☆ Reviewed September 05 www.jessops.co.uk	Good quality and detail, and great value for money if you order large quantities of prints in one go.
3	**Kodak Easyshare Gallery**	
	From 19p per print ★★★★☆ Reviewed September 05 www.kodak.co.uk	Produces good-quality prints. Unlimited storage available and a variety of image-editing tools.

HOW TO BUY

If you're mainly interested in sharing your photos with friends and family, look for services that offer unlimited storage space on their sites. Also, find out about the process of uploading your photos. A lot of services use dedicated software where you can upload as few or as many photos at any one time as you want – useful if you often have hundreds of snaps to transfer.

When it comes to printing photos it all depends on your own preferences. The services we've tested produce varying results in terms of quality. Other factors such as price, delivery time and printing options should also be taken into consideration. Look out for special offers available. Some sites offer free credits when you order bulk prints, or recommend a friend to the service.

SATELLITE NAVIGATION

1	**Navicore Personal**	
	£129.95 ★★★★☆ Reviewed January 06 www.navicore.co.uk	Excellent sat nav device with touchscreen display. Easy to use and comes at a good price.
2	**Tomtom Go**	
	£370 ★★★★★ Reviewed February 05 www.tomtom.co.uk	Excellent sat nav device with touchscreen display. Easy to use and comes at a good price.
3	**Route 66 Mobile Britain 2006**	
	€149 (£101 approx) ★★★☆☆ Reviewed January 06 www.66.com	A neat symbian solution, enhanced by live traffic updates via the Internet

HOW TO BUY

Fed up with getting hopelessly lost in the countryside? Satellite navigation is here to help. There are various models available, from PDA applications through to standalone devices. If you opt for a PDA version, make sure it includes a GPS receiver. These come in various styles including infra-red, Bluetooth and standard wired models.

Standalone devices offer an alternative to PDA versions. Most also feature a touchscreen display and integrated GPS receiver. If you're planning to travel round Europe, check out the level of detail offered. Although many say they come with European maps, most will only detail major roads.

Check if you're able to upload your own POI (points of interest), which could include speed cameras and traffic hotspots.

JANUARY 1991

From the archives: Take a look at the important events in technology five, 15 and 25 years ago.

In this issue we introduced readers to IBM's new PS/2 Model 90, Big Blue's second 486 desktop to enter the market. Priced at a whopping £8,500, the Model 90 came with a 25MHz CPU and 160MB hard disk. PCW's Guy Swarbrick felt that even with IBM's new Micro Channel Architecture, there were still plenty of other desktops available with standard Super VGA cards that were faster and a lot cheaper.

Before the Sony Playstation and Sega's Dreamcast, the Japanese company SNK produced the Neo-Geo – a games console that outshone its rivals in terms of power and graphics. However, if you think the current must-have gadget Sony Playstation Portable is expensive, the Neo-Geo sold for £350, with its games priced at £180 each. Basing his judgement on these ludicrous prices, Chris Cain rightly predicted that the Neo-Geo wouldn't do well in the UK.

In our 'Long Term Test Report', Simon Rockman gave us his views on Microsoft's Word for Windows 1.1. He complained about its tendency to save changes to files using the name of the person running the program instead of the original author of the document. He also discovered that other programs on his computer unnecessarily looked for files on a disk that he had previously used for Word documents. Despite these qualms, Simon found the program easy to use and very capable of desktop publishing.

JANUARY 1981

'The bland leading the blind?' ran this issue's cover line, pointing to an article about the decision-making processes you should go through before buying and describing how to deal with sales people. The advice, from writer Lyn Antill, was to decide which questions you want answered and to stick with them, while (of course) increasing your knowhow by reading *PCW*.

For enthusiasts with a train set in the spare room, Jeff Barton described a micro-controlled train layout that was part of his research into realtime control applications. An MSI 6800 microprocessor operated the 10 x 5ft track through an interface with collision avoidance and the means to generate automatic routes.

David Levy took a peek at poker and explained an algorithm for the card game. This was based on a system for estimating the probability that the opponent's downward-facing card is of a certain denomination. One has to question whether David was ever permitted to enter a casino himself.

JANUARY 2001

The cover of 2001's January issue asked whether the soon-to-be-released Playstation 2 from Sony was 'the future of home computing?'. Given that millions of loyal fans had been waiting for the release with baited breath and the amount of speculation the launch had created, some devotees were always going to be disappointed. Riyad Emeran called it an 'impressive piece of hardware' and remarked on Sony's effort to produce a box capable of more than playing just games. With two USB and a Firewire port, the PS2 offered plenty of opportunities for peripheral connections and the DVD player meant that buyers could kill two birds with one stone.

Mp3 players have come a long way since this issue was on sale. Of the 19 devices we looked at, most included only 64MB of memory and were priced at £160 upwards. The S3's Rio 500 was crowned the best all-rounder in our test. With 64MB of onboard memory, USB connection and excellent sound quality, the device also featured firmware that could be updated.